the OIL AND GAS JOURNAL

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Texas output to rise in '60 ▸ 39

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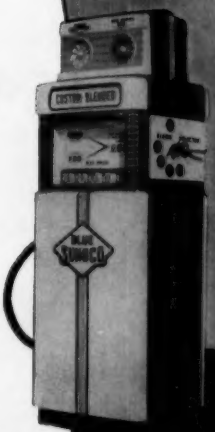

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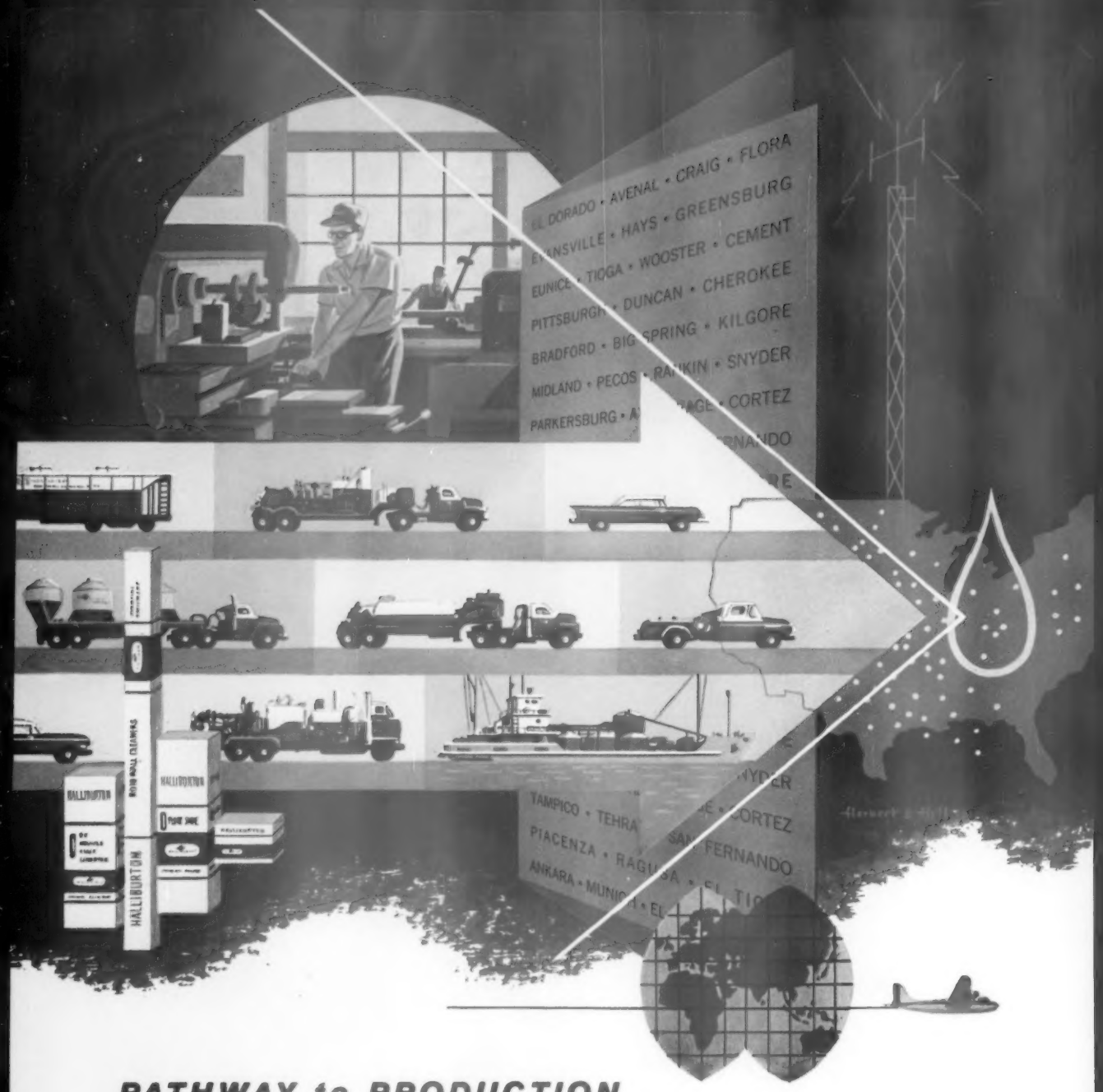
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DUNCAN, OKLAHOMA

OIL AND GAS JOURNAL
Vol. 57 No. 49

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Annual index available on request.

TECHNOLOGY—OPERATION

Pipelining

Procedure for Adequate Testing of Multiphase-Flow Pipelines 60
By Orin Flanigan

An AGA-API two-phase-flow committee report. The procedure is directed specifically at two-phase, two-component flow. But it may be modified for the case of two or more liquid phases. Measurements and properties necessary to evaluate test data are included.

Pipeline Construction Report 94

Drilling-Production

Procedure for Adequate Testing of Multiphase-Flow Pipelines 60
By Orin Flanigan

Electric Drive Cuts Rig Upkeep Expense 74
By J. T. Ragan

Here's an analysis of interest to contractors planning to buy a new rig or equipment to upgrade one already owned. The figures are based on a study of 125 rigs, and some 28,000 days of rig operation. Cost comparisons are limited to operating-cost factors which are a direct function of the type of transmission used.

Automatic Manifold Controls Water Injection 91
By D. H. Stormont

A unique system for regulating the amount of water going to individual injection wells is being used by Union Oil Co. of California at a water flood in Dominguez field near Los Angeles. Controls automatically ration the amount of water going to each of 12 injectors in proportion to the total volume available.

Refining-Processing

Pincher Creek Gas—A Sweetening Challenge 67
By Charles Buskel

Unusual instrumentation keeps this gas which contains 11% hydrogen sulfide, 6% carbon dioxide, and trace amounts of carbonyl sulfide and carbon disulfide, sweet at the plant outlet. The plant can treat more than 270,000 M.c.f.d. of sour gas at three different pressures. Low amine flow or excessive gas flow will shut off gas to a given contactor. Each contactor has flooding and foaming alarms. Three 225-long-ton sulfur-recovery units are in operation with a fourth plant planned for the near future.

New Automatic Flash Tester 70

Questions on Technology 72

How much pollution can fish tolerate? References on liquefied-gas transportation.

Waste-Water Aeration—Key to Efficient Removal of Impurities 78
By B. V. Prather

Aeration of waste water in a closely packed tower is highly successful in removing impurities. This is the most significant find from an aeration study made by DX Sunray. Results of the preliminary experiments were so promising that a more comprehensive program, designed to establish the most effective and economical method of aeration, is now under way.

The OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Nov. 30, 1959

It's time to start planning next year's business:

Petroleum economists see some brighter signs for oil in 1960. A consensus shows these probable gains:

...Domestic demand up 3.9%.
...Domestic production up 4.9%.
...Crude production alone up 5%.

What this means to producers is shown in Texas. That state is producing 38.1% of U. S. oil this year, and will average 2,685,000 bbl. daily. On this same basis, in 1960 average production will be 2,821,000 bbl. daily.

State went on 10-day producing rate for December and during 1960 will enjoy more producing days than in 1959 (p. 39)*.

▼ ▼ ▼

Sobering food for thought:

A panel of 11 distinguished economists at a forum held by National Industrial Conference Board indicates Americans may be taking too much leisure for their own future economic well being.

They noted U. S. now stands at bottom of list of major nations in terms of annual rate of economic growth. The per capita output in U. S. has shown little if any rise during the past 5 years. Rest of world has enjoyed vigorous growth.

Behind this fact is preference of Americans for more leisure rather than more goods. Their warning: Something must give in U. S. structure of wage and capital costs that will improve our competitive position in world markets.

▼ ▼ ▼

Alaska is packaging tracts in its first offshore lease sale cleverly to interest independents as well as majors.

The tracts have been kept relatively small—from 3,760 acres down to 640 acres in size.

They also lie in narrow band along coast, which means the

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*Refers to an article in this issue giving more details. Where no page number is given, the item is exclusively in the Newsletter.

operators can drill them from onshore sites or from barges.

Alaskans hope oil industry shows its interest with some healthy bidding. If so, other sales will follow. The new state is looking for revenue to replace sagging onshore leasing activity (p. 43).

Louisiana also plans another lease sale of offshore tracts. Date is February 18. Deadline for nominating tracts is January 11. Federal Government plans sale about same time.

Rumors persist of a probable discovery on offshore Parcel A off Santa Barbara County, Calif.

The talk has sent Pauley Petroleum stock up 5 points in a few days.

Only word from the well, 3 Phillips-Pauley, is that drilling is going ahead below 7,100 ft. from a floating barge. Phillips, Pauley, and others obtained the lease for a cash bonus of $13.5 million in 1958.

▼ ▼ ▼

Pure's Northwest Lisbon strike in San Juan County, Utah, is fast becoming most important strike in Rockies in some time.

Well first attracted wide industry attention by its big gas flow in the Mississippian. Now Pure has recovered 7,500 ft. of clean, high pour-point oil on test in the Devonian at 8,261-382 ft. Nearest Devonian is in Wyoming (p. 47).

Michigan's first off-trend Trenton oil prospect in several months is Clerci-Phillips 1 Cox in Hillsdale County, 12 miles south and 10 miles west of Scipio field.

Drill-stem test at 3,159 ft. carried 200 ft. of oil and mud. Trenton was found at 3,049.

In Scipio itself, the McClure 1 Northrup was still out of control after 8 days. It is alternately blowing gas, oil, and water from 3,804 ft.

New hot spot in Mississippi is recently discovered McComb field in Pike County.

Field's third well, Ballew 1 Holmes Unit, is a 2-mile northwest extension of production and paves way for a big drilling play. It flowed more than 330 bbl. of 40.9°-gravity oil daily through 11/64-in. choke from 11,000-ft. Tuscaloosa sand.

▼ ▼ ▼

Floor for prices of sizable gas reserves on the Gulf Coast in Louisiana seems to be 20 cents per M.c.f.

Pan American in supporting a 22.1-cent price before

FPC reports prices under some 100 contracts range from 20.75 to 24.8 cents including tax reimbursement. Top was paid for an intrastate sale.

Bids on 720-mile crude pipeline are being sought by the Government of India. Deadline on bidding is January 7.

Involved: 260 miles of 16-in. from Nahorkatiya field to Noonmati, site of a proposed refinery, and 460 miles of 14-in. from Noonmati to Barauni, site of another proposed refinery.

Builder of line will be Oil India Private, Ltd., owned two-thirds by Burmah Oil Co. and Assam Oil Co. and one-third by the Indian Government (OGJ Nov. 23, p. 60).

New Libyan crude pipeline to Mediterranean being considered by Jersey Standard may emerge as joint-interest system, following pattern of operations elsewhere.

If other companies follow up initial drilling success, they are expected to be interested in joining Jersey in a project as a means of reducing costs.

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New method for converting the energy of fuel into electrical power has been successfully applied on an experimental basis.

The new device is based on the principle of magneto-hydrodynamics. It would increase conversion efficiency 25%, substantially reduce installation costs, and would use fossil or atomic fuels.

Avco Corp. demonstrated a model in New York recently and claimed 10 utility companies are backing research on the method (p. 52).

Semisynthetic fluid catalytic-cracking catalyst has proved itself with at least one refiner over a 18-month operating period. Results are termed very satisfactory.

Compared to a synthetic low-alumina catalyst, the new semisynthetic material has shown no decrease in product quality. Product distribution is about the same, and no appreciable change in catalyst consumption has occurred.

Unionists say peace-maker in settling strike at Amoco plant in El Dorado, Ark., was committee of citizens.

This civic-minded group worked out wording of compromise work clause which broke the deadlock. Both management and the OCAW local considered the clause satisfactory.

Interesting are comments of both sides. Amoco feels the clause allows work assignments across classification lines. Union says clause puts end to double loading or working two jobs at once.

OCAW claims El Dorado settlement is no pattern for

ending strikes at Sugar Creek, Mo., and Texas City, where the disputes have been much more bitter.

Sun is finding custom blending profitable.

The six-grade marketing system has boosted Sun gasoline sales at twice the rate of industry gains.

Result is company plans an intensive expansion of the custom-blending pumps in its 22-state marketing area. Cost will average $3,200 per station and run past $30 million.

One fact shown by the pumps so far: Motorists are learning to fit the gasoline to their cars better (p. 44).

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The Washington beat:

Interior Department is asking for funds for coal research, apparently to mollify coal interests irked by Eisenhower's veto of a bill to establish a coal commission.

Progress toward reactivation of the Foreign Petroleum Supply Committee was made at a recent meeting of military, Interior, Justice, and industry representatives. Names of prospective members may be circulated soon.

Service station count: Office of Business Economics and Census Bureau will try to work out a common basis so their station totals won't vary so widely.

Final regulations will be published soon on procedures for oil jobbers who choose to pay the federal gasoline tax directly to the government instead of to their suppliers (p. 48).

Some Washington oil observers are willing to bet that oil may lose some tax benefits in the next 2 or 3 years. This week's panel discussion on percentage depletion before the House Ways and Means Committee may lengthen or shorten the odds on such a bet.

▼ ▼ ▼

More rotary rigs are going to work again.

Total in U. S. jumped by 47 rigs last week to 2,206. This is highest level of activity since flurry of drilling in June and early July just prior to the steel strike.

Aside from the early summer period and the current upswing, rig activity has remained under 2,200 all year.

Foreign notes: Libya's Zelten field now has a stepout discovery which boasts a new prolific pay zone at a deeper level after first believed dry (p. 56)...Cuba is raising the specter of nationalization. New law will force oil companies to drill their concessions or lose them, will impose production quotas on refiners (p. 57)...Austria may resume negotiations soon on claims by foreign oil companies whose properties were confiscated by the Nazis in 1938.

Good Wells Make Good News

A Monthly Report On Wells That Are Now Worth More

November 30, 1959

This month, the jobs reported are more of those engineered by Dowell with the aid of the "Frac Guide"*. You will notice the excellent results.

- Greenwood County, Kansas (New Oil Well) This open hole completion was made into the Bartlesville sand from 1837 to 1862 feet. Production was only one bopd. Dowell engineers recommended Waterfrac on the basis of calculations made with the "Frac Guide". 5000 gallons gelled water with FLA* (Fluid Loss Additive) and 20,000 pounds sand were injected down casing at 27 bpm and 800 psi. Five days after treatment, well was flowing 100 bopd with only a show of water.

- Brazoria County, Texas Gulf Coast (Old Gas Well) Gas production had declined to only 417 mcfd. Pay was the shaly Frio sand from 6214 to 6224 feet. The "Frac Guide" indicated the use of Acid Petrofrac*. Dowell injected 5000 gallons acid-oil emulsion and 15,000 pounds 40-60 sand at 6 bpm and 4400 psi. Treatment was made through tree down 2⅜-inch tubing, allowing the operator to avoid using a workover rig. Production rose to 9000 mcfd — more than a twenty-fold increase.

- Glasscock County, West Texas (Old Oil Well) This Spraberry well had depleted both the lower Spraberry and the shallower Clearfork. The operator plugged off both these zones and re-completed into the upper Spraberry by perforating the casing from 6870 to 6905 feet. Then Dowell engineered a treatment with the "Frac Guide" using 10,000 gallons refined oil, a fluid loss control agent, 35 perforation ball sealers and 45,000 pounds sand. After treatment, which was down 3-inch tubing, the well potentialed 93 bopd.

- Montague County, North Texas (New Oil Well) This well swabbed only one boph after completion into the conglomerate through three sets of perforations between 5852 and 5928 feet. Dowell engineered a four-stage down-casing fracturing treatment that included 40,000 gallons gelled crude, 60 ball sealers, 2000 pounds of a fluid loss control agent and 94,800 pounds sand. Before the treatment, 500 gallons of Mud Acid was used to wash the formation and the well was swabbed. After treatment, well tested 432 bopd, flowing on ½-inch choke.

In area after area, Dowell continues to get improved results with the "Frac Guide". Take advantage of this experience to help you get the results you want. For service or detailed information, contact the Dowell office or station nearest you. There are more than 165 locations in the United States, Canada, Venezuela and Argentina. Dowell, Tulsa 1, Oklahoma.

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Helpful Hints

- Packaged rods should be handled only with suitable equipment. Adequate grapple-lines prevent sagging and bending. Rods are packaged for protection and convenience, an advantage to be used, not abused.
- Rods should be transferred singly. Do not throw, flip or whip. Wherever possible they should be evenly supported end to end.
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- Do not walk on rod stack during loading or unloading.
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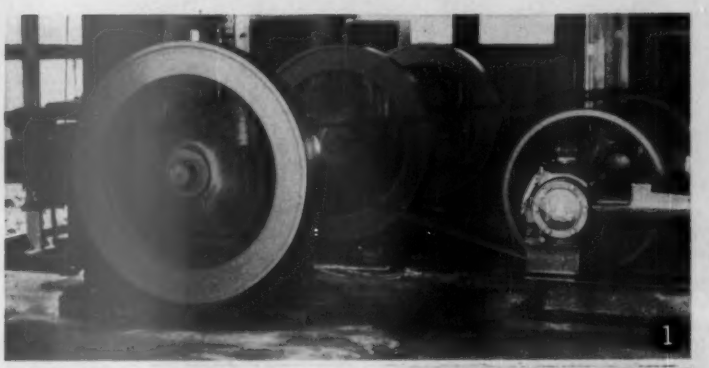
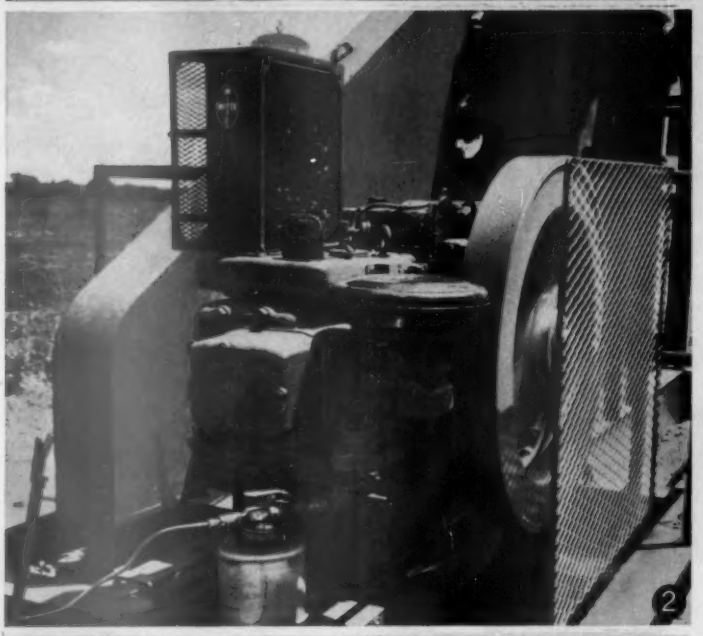
Buy From Your NORRIS Distributor

More Texas producers choose Witte Engines for waterflooding





Whether for driving your waterflood pumps or operating your pumping units . . . Witte Engines will give you steady service, low maintenance and reliability. These are the reasons why more Witte gas or gasoline engines are being used as prime movers on oilfield projects in Texas and elsewhere. Their smooth-running characteristics make them adaptable for wide-base pumping units with minimum foundations for the engines.

A full line of heavy-duty engines is available in sizes from 3¾ to 42 horsepower. Many in this line are convertible to full diesel. Complete information on them is available through all oil field supply stores.

USS and Witte are registered trademarks

1. Three Witte F-28 Engines driving pumps on a waterflood near Wichita Falls, Texas. The engines have been in service approximately two years. Approximately 2,000 gallons of water are injected daily in 80 wells, with natural gas used as fuel.

2. Installed on a wide base pumping unit, this Witte F-42 Engine is a prime mover for a producing well on a waterflood near Haskell, Texas. The well produces approximately 300 barrels of oil per day from 3,800 feet. L.P. gas is used as fuel.

3. This is one of three Witte F-28 Engines in use as power source for pumping oil from waterflooded wells in the vicinity of Bowie, Texas. Engine illustrated is on a well producing approximately 400 barrels of oil per day from a depth of 4,100 feet. The engine is equipped with a Witte installed "Automatic Water Make-up Kit" for extended and unattended operation.

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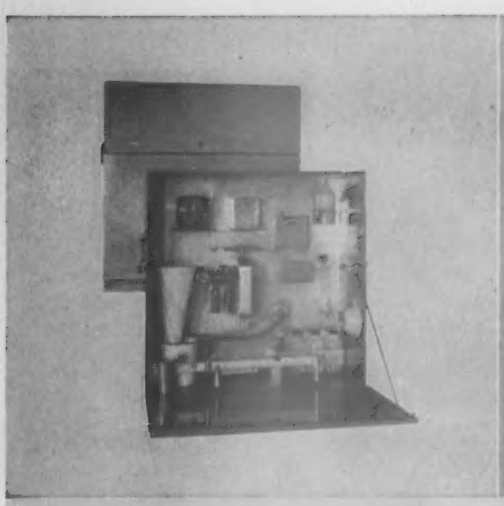

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ppm	% vol	cc	lbs/cu f	
lbs/gal	cp	°F	sec	pH
ppm	% vol	cc	lbs/cu f	
lbs/gal	cp	°F	sec	pH
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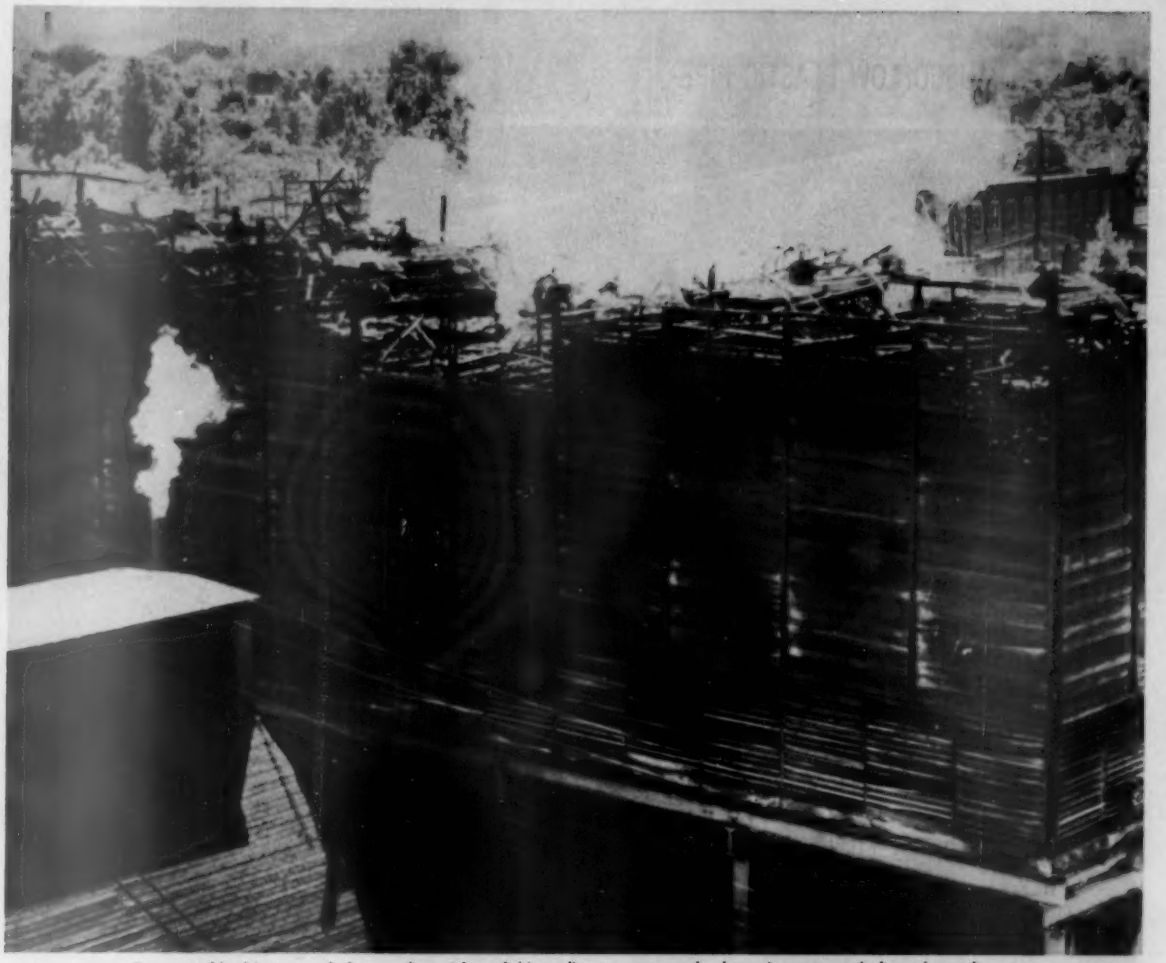

Fire caused by friction spark destroyed top 6 feet of this cooling tower, severely damaging motors, shafts and gear boxes.

Protect your water cooling tower from crippling fire with a Grinnell System!

Water cooling towers are essential in many industries today. But cooling towers can, and do, *burn*! Furthermore, fire may strike when the tower not only is shut down, *but even while it is in use*. One insurance company has stated that nearly half its losses involving towers occurred when the towers were in operation!

Why are cooling towers so vulnerable to fire? Because they are largely made of wood. It is true that when the tower is operating most of the wood is wet. But roof and sides can become excessively dry through exposure to the sun. Also, there is a portion of the tower above the cooling water distribution system that is never wet.

Your best protection against an unexpected blaze is a Grinnell Water Spray or Automatic Sprinkler System. Grinnell will engineer an installation for you that will protect your tower — possibly your entire production program — against fire, no matter how it may start. Common causes of fire include defective wiring, overheated bearings, and lightning. So call in a Grinnell engineer. Let him analyze your needs. Remember, he is well qualified to help you . . . backed by a company with 89 years experience in the fire protection field. Grinnell Company, Providence 1, Rhode Island.

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salt-water lines **fresh-water lines***
natural-gas lines **electrical conduit**

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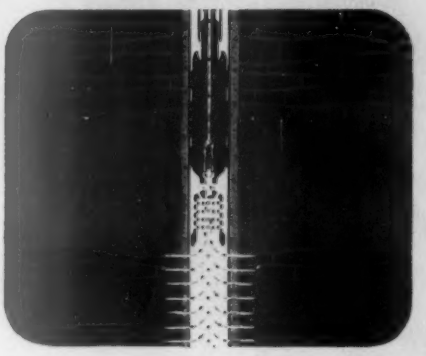
"SPECIALIZED"

SQUEEZE CEMENTING with HALLIBURTON TOOLS



Squeeze Cementing and Bridge Plugging operations have a history of success in thousands of wells – in a multitude of various applications – in most all types of formations... extending the natural producing life of oil and gas wells and employing a conservation program of natural energies for oil production economy.

Specialized Halliburton tools and equipment, offers flexibility in cementing operations which can help accomplish many special purposes and help solve many special remedial problems.

Here are some *specialized* Halliburton drillable packers that permit maximum flexibility in application for a higher ratio of remedial success in producing wells:

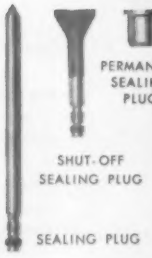
"DM-DC" DRILLABLE SQUEEZE PACKER/BRIDGE PLUG WITH CIRCULATING VALVE... the industry's most versatile tool for either squeeze cementing, or as a bridge plug!

For general application in any well, regardless of depth or pressure... effects a positive fluid shut-off from either direction... of simple design and easily run in and set on tubing, drill pipe, drilling or sand line.

Type "DM" is constructed of high strength "drillable magnesium alloy" for squeezing or temporary bridge plugs... type "DC" is made of "drillable cast iron" for squeezing or permanent bridge plug and may be used as a temporary bridge plug when desired.

The "DM-DC" Drillable Squeeze Packer is easily converted into a bridge plug by dropping a Sealing Plug through tubing into the packer or installing a Permanent Sealing Plug before running tool into the well... Shut-off Sealing Plug may be pumped down through 2" or 2½" tubing and shuts off in the packer. The rubber cup helps to prevent contamination between fluids.

OPEN HOLE "DM-DC" DRILLABLE Squeeze Packer with the addition of an extension mandrel and a long rubber seal element. Used extensively in hard open hole formation near to true bit size, and has been set in depths of 11,000 ft. holding pressures up to 5,000 psi. Simple setting procedure is the same as in the regular squeeze packer and bridge plug but cannot be set by any type of setting tool run on a wire line.



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HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN OKLAHOMA

"284 SERVICE CENTERS – JUST MINUTES AWAY FROM YOUR WELL"

You can depend on purchased electric power for

LOW COST PRODUCTION

Two electrified pumping units working together in West Texas

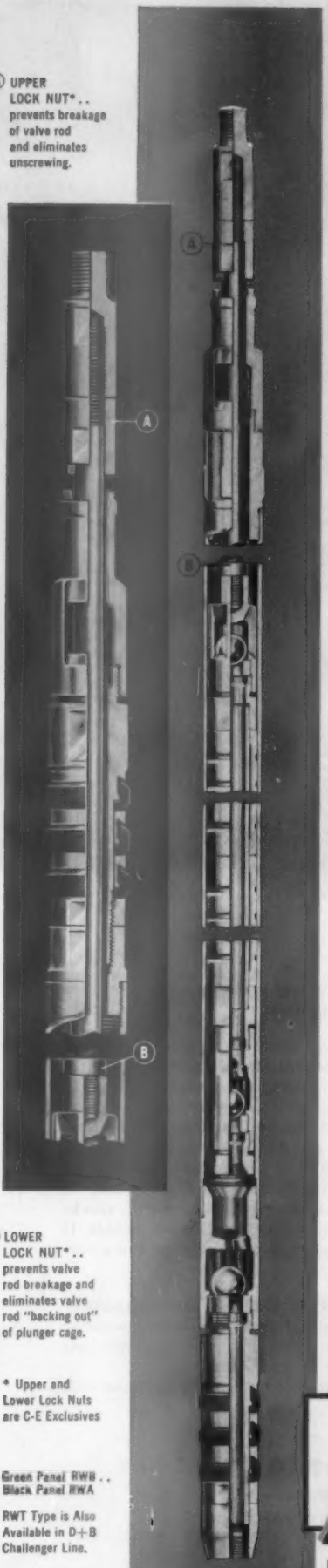
Economies of purchased electric power have been proven time and again for producers who have learned to depend on utility service in their fields. Saving in manpower and adaptability for automatic control makes utility electric power ideal not only for production but for gathering, pipeline and refinery operation. See your nearest utility electric power company for details or write the Petroleum Electric Power Association.

Purchased Electric Power . . . saves money, manpower, maintenance, and serves you better automatically

Petroleum Electric Power Association

P.O. BOX 35006, DALLAS 35, TEXAS

Ⓐ UPPER LOCK NUT* .. prevents breakage of valve rod and eliminates unscrewing.



Ⓑ LOWER LOCK NUT* .. prevents valve rod breakage and eliminates valve rod "backing out" of plunger cage.

* Upper and Lower Lock Nuts are C-E Exclusives

Green Panel RWB .. Black Panel RWA

RWT Type is Also Available in D+B Challenger Line.

It takes only one line
to pump all medium to deep wells

CONTINENTAL-EMSCO D+B CHALLENGER PUMPS

Various metals, pump types and pump combinations give *extra flexibility* to D+B Challenger pumps. Interchangeability of their API parts cuts inventory costs. Types are available for all well conditions .. crooked or slant holes .. medium deep to wells over 7,000′. Challenger pumps can be assembled to pump stripper wells, sandy or gaseous fluids. Many corrosive resisting plunger-barrel tube combinations and special cages, fittings and balls and seats can be selected to handle sweet, sour or oxygen corrosion. Special pump combinations to provide extra volume, pump extremely gaseous fluids and meet other well peculiarities can be assembled from standard Challenger pump parts with the use of only a few special parts.

Special Features

VALVE ROD COUPLING AND WING LOCK NUT allow precise spacing of traveling and standing valve for maximum pump efficiency.

PLUNGERS are made of various corrosion resisting metals. They are interchangeable between all types of Challenger pumps and may be switched *end for end* within pumps for longer wear. Plunger sections may be replaced economically after long and hard usage.

ARMORED CAGES are precision machined and given special heat treatments. Ball guides are treated to an extreme hardness to resist wear and assure long life. Outside diameter of body of the cage is given another special heat treatment to insure toughness and durability. C-E's Armored Cages are standard in the make-up of the Challenger pump.

Put D+B Challenger pumps
to work in your wells.

For Service that Sings .. Equipment that Hums .. Go ..

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

P 906

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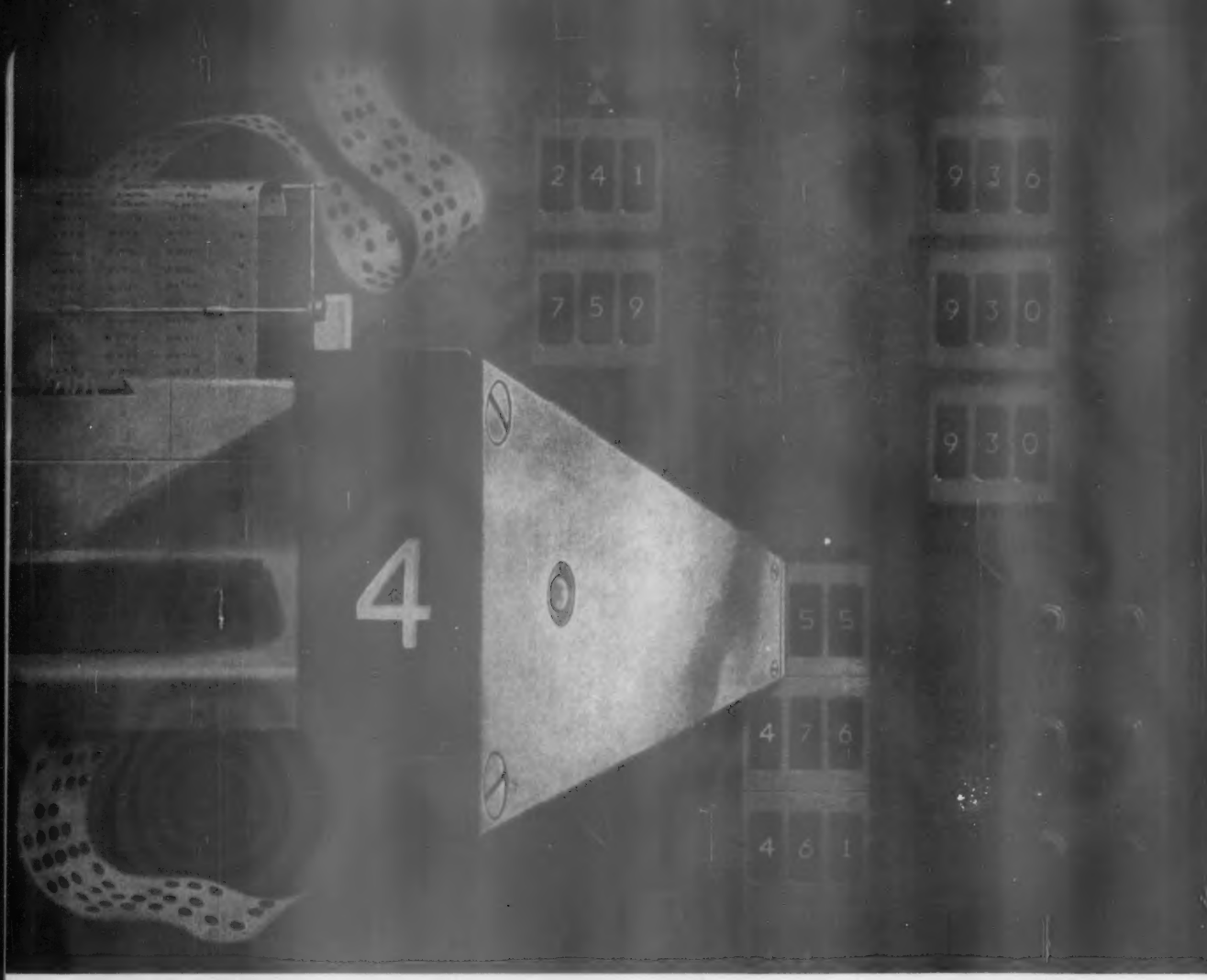


NEW CONTROL CONCEPT can cut your pipeline costs

Did you ever try to solve a jigsaw puzzle without first looking at the total picture the puzzle makes? Pretty difficult—maybe even impossible. Best way, easiest way is to look at the big picture first, then see where the individual pieces fit.

It's the same with pipeline control.

First, look at your total system problem. Then, determine what sort of control system is required to safely, reliably and economically meet tomorrow's need as well as today's. That is Union Switch & Signal's approach to pipeline control.

Any part of a pipeline system. Union Switch & Signal can incorporate in a centralized control system any or all of the following functions: supervisory or remote control of satellite stations . . . telemetering of flow data from field back to your central dispatching office . . . automatic sequencing or control of equipment in the field . . . instrumentation . . . data handling and display . . . computing equipment . . . automatic integration of field data into your accounting operations . . . communications. Union Centralized Transport Control can be adapted to *any* problem from remote control of a single-unit booster station for gas or oil to automatic centralized control of an entire system from wellhead to ultimate consumer.

Error-free. Whatever the job assigned to it, Union Centralized Control operates completely free from error because it reduces to coded digital form all information and instructions transmitted to or from your central control office. As a result, you can transmit far more precise data than ever before; you can use the least expensive available communications service; and you never need to worry about lightning, noise or other interference causing a wrong or dangerous operation—this coded system automatically checks itself and responds *only* to correct and logical signals. It helps make your pipeline safer. It provides error-free *security* as well as reliability.

Lower operating cost. Most important, Union Centralized Transport Control cuts your operating costs, cuts the cost of future expansion, sometimes even cuts present installation cost of pumping stations.

Write for Bulletins PD 2006, PD 2007 and 1052

"Pioneers in Push-Button Science"

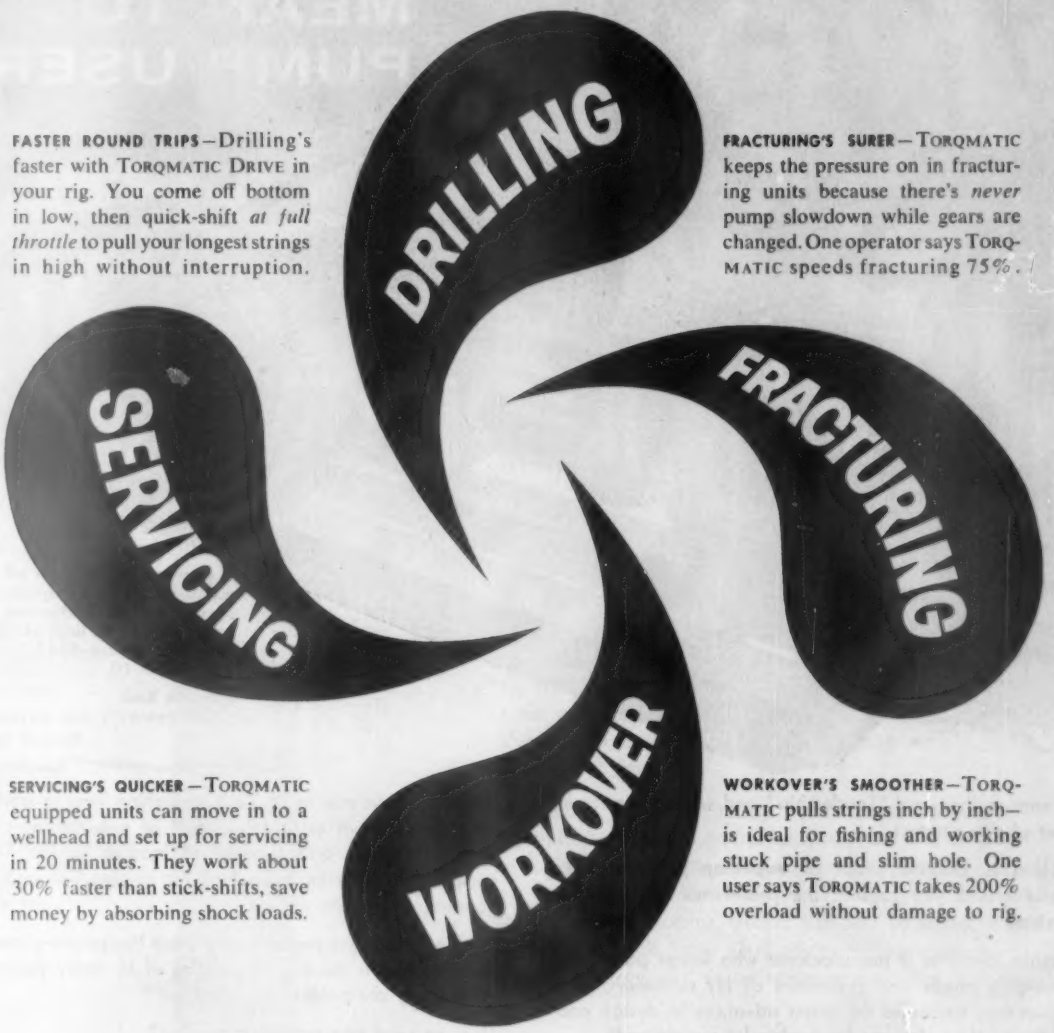
UNION SWITCH & SIGNAL

DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH 18, PENNSYLVANIA

Runs drilling, servicing, fracturing and workover units

SMOOTHER THAN STEAM



FASTER ROUND TRIPS—Drilling's faster with TORQMATIC DRIVE in your rig. You come off bottom in low, then quick-shift *at full throttle* to pull your longest strings in high without interruption.

FRACTURING'S SURER—TORQMATIC keeps the pressure on in fracturing units because there's *never* pump slowdown while gears are changed. One operator says TORQMATIC speeds fracturing 75%.

SERVICING'S QUICKER—TORQMATIC equipped units can move in to a wellhead and set up for servicing in 20 minutes. They work about 30% faster than stick-shifts, save money by absorbing shock loads.

WORKOVER'S SMOOTHER—TORQMATIC pulls strings inch by inch—is ideal for fishing and working stuck pipe and slim hole. One user says TORQMATIC takes 200% overload without damage to rig.

You'll be money ahead with an Allison TORQMATIC DRIVE in your drilling, pumping and hoisting equipment. They're available in units made by most leading manufacturers. For full information, ask your dealer or write Allison Division of General Motors, Indianapolis 6, Indiana.

Allison

TORQMATIC® DRIVES

THE MODERN DRIVE FOR MODERN EQUIPMENT

WHAT 44 YEARS OF *Leadership* MEAN TO PUMP USERS

"A good example of an oil field pump which sees a great deal of use in this (gathering line and small trunk line) service is the Gaso Figure 1742 2½-5½ x 10."

From the Book
"HYDRAULICS FOR PIPELINERS"
by C. B. Lester

Let's examine the word "Leadership" and what it means to the user of any product.

Leadership is positive proof of **superior performance.** How else would you explain the preference that creates leadership?

Leadership identifies a manufacturer who keeps pace with the changing needs and conditions of his customers, and a product that embodies the latest advances in design and construction. How else can leadership be maintained?

GASO's leadership in its field, stretching over a period of 44 years, is built on a foundation of experience, concentration, research and service, all leading to the kind of performance exacting users look for in pipe line and water flooding operations.

This and this alone explains why Gaso Pumps are a standard specification in the buying policies of so many progressive oil industry companies.

May we send you our latest catalog?

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for every oil industry need

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Anti-lock prevents relative rotation between anchor cage and tubing while running

Re-latch threads prevent upper slips from setting until ready.

Long, flexible drag springs allow easy recovery in case of washover.

Special seal protects against fouling from sand or scale.

Internal shoulder creates a differential piston inside rubber to cause a tighter seal.

Full setting force is transmitted to packing element through lower head. No scrubbing action between lower slips and casing wall during setting stroke.

Guiberson
permanent completion

TYPE A DRILLABLE PACKER

runs and sets easily, quickly

- ***Built-in safety against premature setting***
- ***Set and produce in ½ tubing trip***
- ***Unequalled rubber seal***

Guiberson Type A Drillable Packer gives you a versatile packer for many uses..single or multiple zone production, acidizing, pressuring operations, water-flooding, testing, corrosion control and many others.

New safety factors against premature setting are provided since the transmitting of drag from tight casing or impact from junk is direct to the tubing string.

The Type A can be set and placed in production with only ½ tubing trip. Spacing problems are easier, especially when run in combination with a multiple zone packer. From rig floor to completion, the Type A runs and sets faster than any other permanent packer.

Guiberson superior quality rubber and special lead-alloy thimbles compress fully for a leak-proof seal. Setting is quick, easy and uncomplicated..may be set by wire line. Available in 5" through 7⅝" sizes for 2" or 2½" tubing with a full line of stingers and accessories. Ask your Guiberson representative for a recommended installation or write for full details.

GUIBERSON

THE GUIBERSON CORPORATION

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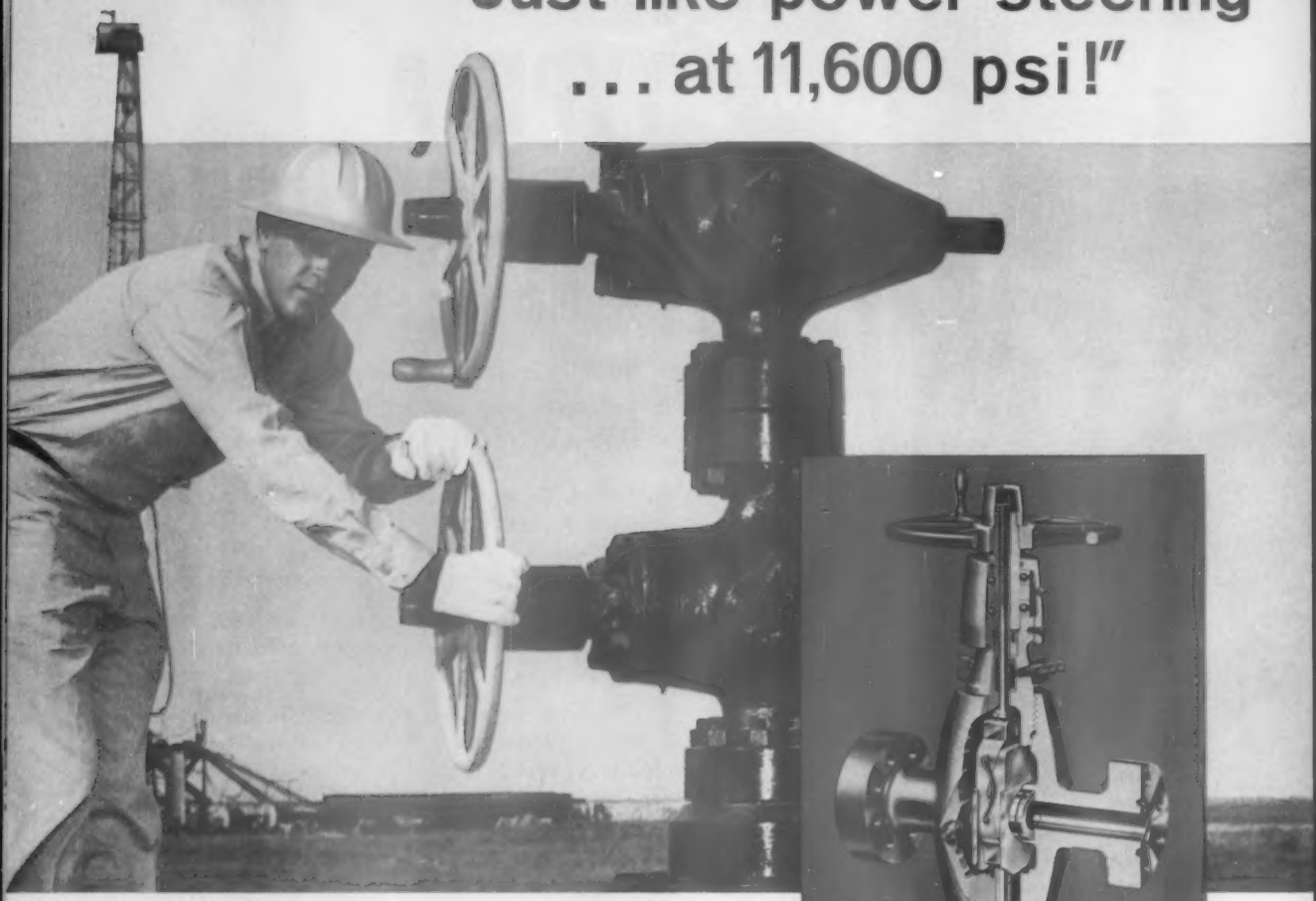
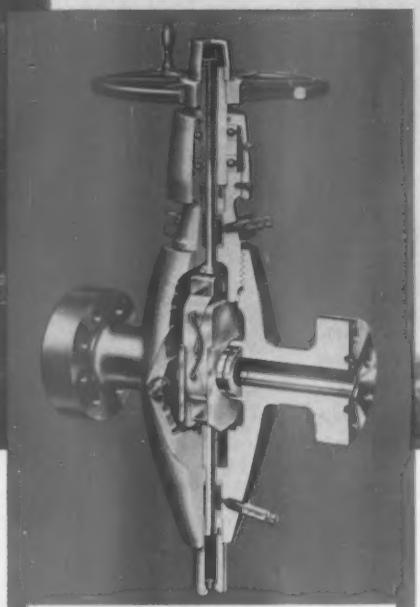
DALLAS, TEXAS
U. S. A.

ONE OF THE DRESSER INDUSTRIES

Sold by Oil Field Supply Stores Everywhere

"Just like power steering ... at 11,600 psi!"





W-K-M® Balanced Stem Valves

These valves are the easiest operating high pressure valves ever made.

Only W-K-M Balanced Stem Valves are designed to overcome the heavy thrust loads carried by bearings and threads in single stem valves. A second stem is attached to the bottom of the gate to balance out body pressure that acts against the operating stem. The only loads to be overcome in opening or closing this valve are packing friction and normal operating loads.

Next time — and every time — specify W-K-M! *Available at leading supply stores everywhere.*

PRODUCT OF W-K-M's *Creative Engineering*

WRITE FOR CATALOG 200

W-K-M

DIVISION OF ACF INDUSTRIES INCORPORATED

P. O. BOX 2117, HOUSTON, TEXAS

W-K-M Balanced Stem Valves feature through-conduit gate construction, parallel expanding gates, controlled force seating, pressure seal bonnets, super-finished stems supported on roller bearings, seating surfaces sealed away from the lading flow.

Sizes: 1-11/16" through 2-9/16".

Working Pressures: 10,000 and 15,000 pounds.

Write for Test Bulletin WP-1058. It describes how this superlative valve successfully passed the oil industry's most punishing tests.

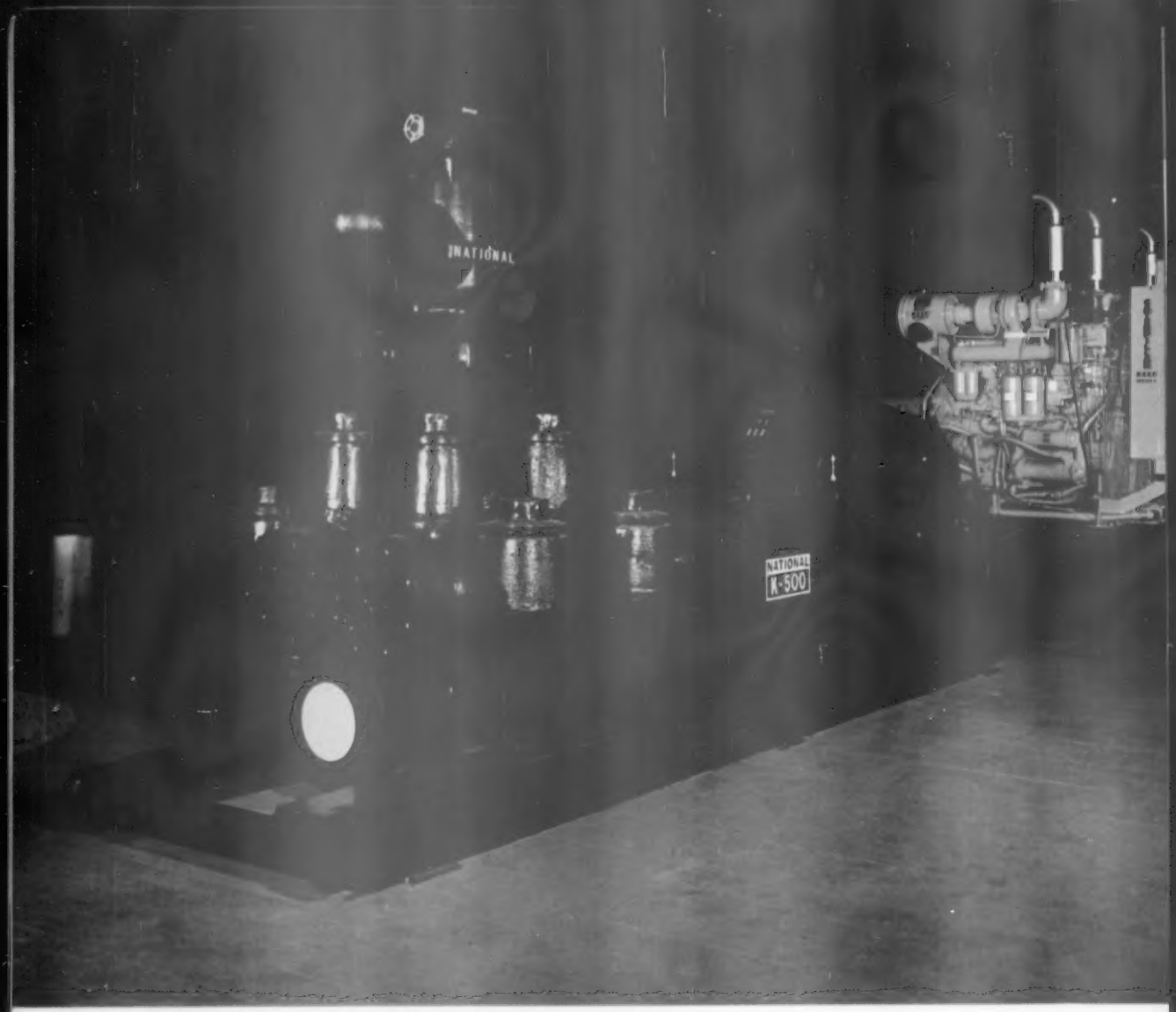
5912-R

These Raybestos Manhattan products are typical of the broad line of quality items stocked and distributed through National's 124 stores.

This is the NATIONAL SUPPLY STORE, too!

The next time you stop in a National Supply Store, remember to shop *behind* the counter, too. You'll see quality products like these Raybestos Manhattan products, Westinghouse Motors, Larkin products, Link-Belt Chain, Ajax Engines, Oilmaster Pumps, Tube-Turn fittings, Rockwell-Nordstrom Valves, Columbian Rope and many more. Wherever you go, National Supply offers you an unmatched variety of quality products.

On the next pages:
New NATIONAL Slush Pumps!



The new K-500 Pump is rated at 500 input horsepower with 7½-inch minimum bore and 15-inch stroke. Its rated speed is 70 strokes per minute.

New NATIONAL Type K Pumps set the

They're rugged, lightweight and easy to maintain!

Would you like 19 easy accessibility features that make a pump easier to maintain? They're here. The features you want . . . the features that help to make money for you . . . are in these new slush pumps from National. Both the K-500 and K-700 are carefully designed for all modern drilling needs in their horsepower ranges,* and will give you better service than any comparable pumps you can buy. Big statement?—yes, but look at the advantages that make it possible:

- These K pumps incorporate new design fluid ends that provide easier maintenance—fast change cover plates and cylinder heads.
- Light weight with high structural rigidity—reduces transportation costs.
- Longer life for connecting rod and main bearings—harmful reversal load impacts effectively controlled.
- Easy crosshead maintenance—tapered crosshead pin simplifies removal and reassembly of crosshead.

*For horsepower needs beyond 700, ask a National representative about the successful H-850 and H-1250 pumps which these K models complement.

The new K-700 is rated at 700 input horsepower with 8-inch minimum bore and 16-inch stroke. Its rated speed is 65 strokes per minute.

pace in streamlined pump design!

■ Reduced wear for stuffing boxes, piston rods, pistons and liners—striking-locking collar on intermediate rod forms positive alignment link between crosshead and piston rod.

■ Efficient lubrication—greased packed roller bearings—pinion, main connecting rod bearings positively sealed against contamination.

■ Accurate piston rod alignment reduces wear—longitudinal bores of power end frame and fluid end positively aligned by accurately machined stuffing boxes.

■ National Pulsation Dampener—eliminates troublesome rubber diaphragms, bags and sleeves—only rubber element is inexpensive valve disc easily and quickly replaceable.

Get the complete story on both of these pumps . . . ask the National man in your area for new bulletins which graphically detail construction and performance features. You'll find that National's Type K pumps are unequalled!

More on the next page . . .

...and NATIONAL Fluid End Parts reduce your maintenance costs!

DUAL SEAL PISTON

Incorporates two replaceable piston rubbers, forming an inner and outer seal at each end of the piston. Void between the rubbers allows space for displacement, minimizes damage to piston lips as it enters liner. Heavy fabric section molded into the back of inner rubber dams off extrusion around the OD of hub, and reduces pinching of the rubber. Forged steel hub of piston resists expansion under extreme loading.

FLUID PISTON ROD PACKING

Fluid pressure actuates the sealing lips. The greater the pressure, the tighter the seal . . . yet the solid make-up through the body of the packing minimizes the danger of overtightening it when it is installed. Rod wear is sharply reduced, because lip pressure is never excessive . . . in fact, it is negligible on the suction stroke.

FLUID CYLINDER LINERS

The ID of the Nationaloy Liner is case hardened throughout its length. Precision honing gives it maximum resistance to wear, washing and abrasion. Outside surface is machined to close tolerances, promoting closely controlled fits which reduce piston and rod wear due to misalignment.

FLUID CYLINDER LINER PACKING

Resistant to oil, gas heat and chemicals, National Liner Sleeves provide a perfect seal between the liner and pump bore. They are sufficiently hard to be confined in the packing space . . . preventing excessive flowing and pinching . . . yet they retain ample resiliency for proper sealing action.

"BLUE STRIPE" AND "BLUE CHROME" PISTON RODS WITH API TAPERS

Have maximum tensile strength and high resistance to impact. Precision ground and polished to reduce wear of both packing and rod. "Blue Chrome" Piston Rods have a super-hard, abrasion-resistant chrome finish which gives added packing and rod life under all conditions.

TYPE G-2 FLUID VALVES AND SEATS

Promote maximum pump efficiency, with maximum effective opening for fluid flow to permit complete filling at high speed. The lower guide . . . integral with the valve . . . has a large contact area which reduces wear and minimizes the possibility of cocking. A heavy clamp plate and lock gives longer valve life.

LOOK FOR THE BLUE AND YELLOW LABELS AT ALL NATIONAL SUPPLY STORES!

THE NATIONAL SUPPLY COMPANY

Subsidiary of Armco Steel Corporation

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another
TRETOLITE SERVICE
report

SOLVO* PARAFFIN REMOVER REDUCES FLOW LINE PRESSURE from 430 to 20 psig

When SOLVO Paraffin Remover treatment was started on a Kansas well, the flow line pressure was at 430 p.s.i.g. Within 48 hours the flow line pressure dropped to 100 p.s.i.g. and at the end of five days' SOLVO treatment, the flow line was operating at its normal pressure of 20 p.s.i.g. The table shows how SOLVO Paraffin Remover was applied.

TIME LAPSE	AMOUNT OF SOLVO USED	WHERE SOLVO WAS APPLIED	FLOW LINE PRESSURE (p.s.i.g.)
Start	5 gals. SOLVO 5 gals. Kerosine	Well Annulus	430
24 hrs.	5 gals. SOLVO	Flow Line	430
48 hrs.	2 gals. SOLVO 1 qt. Moth Balls	Flow Line	100
72 hrs.	0	—	20

*SOLVO *is a registered trademark of Petrolite Corporation.*

An important consideration in this case is the fact that the flow line pressure had built up to the 430 p.s.i.g. with a so-called "paraffin solvent" in use. This paraffin solvent cost the producer 20% more per gallon than SOLVO.

P.S.: SOLVO Paraffin Remover was applied to *all* wells on this lease. The reduced flow line pressures in every case showed effective paraffin removal. The improved SOLVO treatment resulted in a savings in chemical costs of $100.00 per month.

SOLVO PARAFFIN REMOVERS CONTAIN NO CHLORINATED SOLVENTS

For complete information,
ask the Man in the Red Car.

PR-59-2

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USE MISSION PUMP PARTS TOGETHER

FOR LONGEST LIFE – GREATEST SAVINGS

Taken individually, the savings you get from any of these Mission pump parts is substantial. But when used together, savings pyramid and down time is drastically reduced. Here's why: each of the Mission parts is the best of its kind that can be made. Mission engineering, Mission quality control, and Mission's experience and research in pumping drilling fluids have seen to that. The truth is that a Mission piston works better and lasts longer in a Mission liner that is specifically made for it. Liners also last longer with Mission pistons because the fabric back of piston rubbers reduces the danger of serious scoring or fluid cutting. So . . . don't just half save. Use only Mission parts on all your pumps. Save all the way.

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They Say—

Interesting, useful

Dear Sir:

Congratulations on your annual Pipeline Number (Sept. 21 issue). This was chock full of a lot of interesting and useful information.

In the article beginning on page 124 by Paul Reed and Gene Kinney, two references were made on pages 126 and 128 to a temperature method of determining centrifugal pump and compressor efficiencies. We would appreciate your letting us know where we may obtain additional information on this.

T. A. Mullett
Atlantic Refining Co.
Philadelphia.

(Editor's note: See OGJ, May 28, 1956, p. 136.)

Listener speaks up

(Editor's note: The Journal frequently has criticized oil men for not defending the industry by making information available to those who may have been misinformed. Now we're following our own advice as shown by this letter from Engineering Editor G. L. Farrar to Henry Royce, Wisconsin congressman.)

Dear Congressman Royce:

I recently heard your radio interview on "Capitol Cloak Room." This was keenly interesting in that you showed yourself exceptionally well informed on a wide variety of subjects.

You made a statement toward the end of the interview which surprised me very much, in light of your earlier remarks. I refer to your statement that part of the business of the next Congress is to plug the "tax loopholes" in oil and other extractive industries.

Mr. Royce, if you will look up what Congress has done on the depletion allowance, you will find that a good 8 years of study went into this knotty problem.

Congress' reasoning when the 27½% depletion allowance was adopted in 1926 was that this was the best possible way to allow for capital investment in an oil or gas field. And, of course, our Constitution provides for the taxation of income from capital but not of capital itself.

A select Senate committee studied the problem thoroughly. This group decided that the worth of an oil field

THE UNVARNISHED FACTS

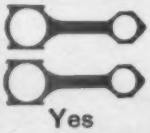
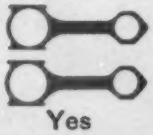
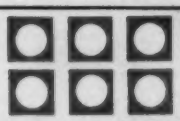
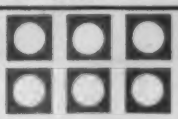
about engine compressors in the 375 to 950 hp range

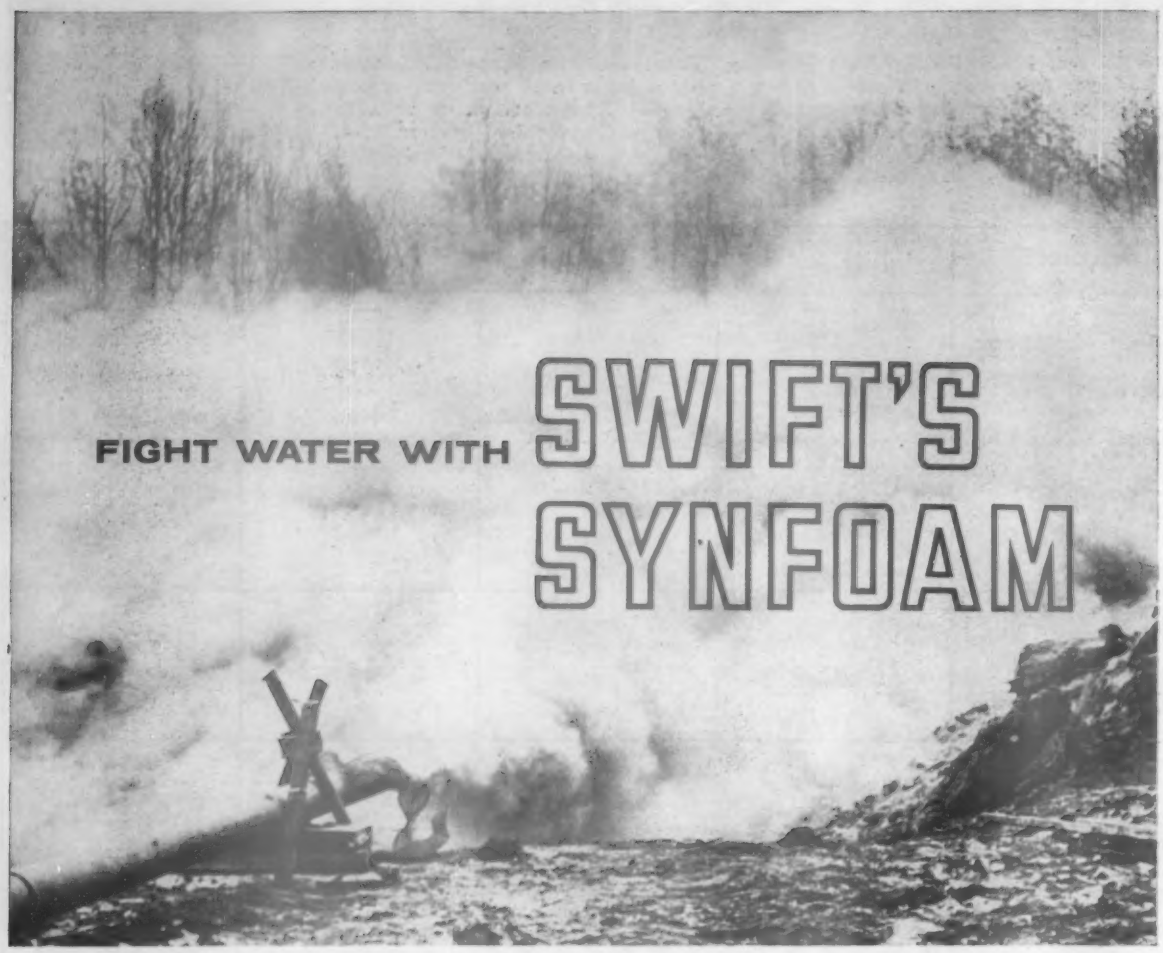
FEATURE	WORTHINGTON SLHC	MFR. A	MFR. B	MFR. C
DESIGNED FOR TURBOCHARGING	Yes	No	No	No
SELF-SUSTAINED TURBOCHARGING	YES	NO	NO	NO
FUEL CONSUMPTION	7,000 BTU/BHP HR	9,000 BTU's	8,600 BTU's	8,500 BTU's
CYCLE	4	2	2	4
CYLINDER ARRANGEMENT	Inline	Inline	Vee	Vee
RPM	450	600	450	400
YEAR ENGINE WAS DESIGNED	1955	Before 1950	Before 1940	Before 1940
NUMBER OF DESIGNS TO COVER RANGE	1	2	2	2
LARGEST UNIT FOR SKID MOUNTING	950 HP	660 HP	1100 HP	660 HP

On these two pages you'll find a comparison of all the significant facts about gas engine compressors in the 375 to 950 horsepower range. We think you'll have to agree that Worthington's SLHC unit is the outstanding performer in its size range. Not only does it have 18% better fuel economy than the next nearest engine, but it also features self-sustained turbocharging, removable cylinder liners with cast-in water jacket, interchangeable power and compressor rods, and many other important engineering advances.

For complete details on the new SLHC engine compressor get in touch with your nearest Worthington district office. Or write to Worthington Corporation, Section 43-4, Harrison, N. J. In Canada: Worthington (Canada) Ltd., Brantfold, Ont.

WORTHINGTON

FEATURE	WORTHINGTON SLHC	MFR. A	MFR. B	MFR. C
MOUNT CYLINDERS ON BOTH SIDES	Yes	No	No	No
CYLINDER LINERS	Removable	Removable	NONE	NONE
INTERCHANGEABLE POWER AND COMPRESSOR RODS	Yes	Yes	No	No
SIDE BY SIDE CONNECTING RODS	 Yes	 Yes	No	No
FRAME CONSTRUCTION	En-bloc	En-bloc	 Separate Cylinders	 Separate Cylinders
IGNITION	Twin	Single	Single	Single
RUNNING GEAR LUBRICATION	MANIFOLD CAST IN BASE	SEPARATE PIPE MANIFOLD	SEPARATE PIPE MANIFOLD	SEPARATE PIPE MANIFOLD
GASKET-FREE CYLINDER HEAD SEATS	YES	NO	NO	NO
RUNNING GEAR EASILY ACCESSIBLE	YES	NO	NO	NO



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			Post Oak Road	P. O. Box 1516		P. O. Box 144

(closely akin to capital investment) was represented by the price that could be obtained for the oil in place in the ground. Then the committee scouted around to see what percentage this in-the-ground value was of the price of oil as it was produced at the well. This was estimated to be 25 to 30% of the wellhead price in 1926. Congress ultimately set the 27½% value.

I'm sure you know that the depletion deduction is limited to 50% of net income, and that the national average per cent depletion allowed, because of this, is actually 23%, not 27½%.

The average price for a barrel of oil in the ground in 1959 is about $1.25. Average depletion allowance is 74 cents per barrel for each barrel produced. It's conceivable that the percentage depletion allowance is unconstitutional because it doesn't allow enough deduction to take care of capital and, therefore, the Government is actually taxing capital.

As a matter of fact, oil will have to have depletion allowance of 35 to 40% within the next few years if we are to have a healthy, expanding domestic industry. Right now we spend more to find tomorrow's oil than we receive from today's production. This net cash inflow cannot continue indefinitely.

May I ask you earnestly and sincerely to reexamine your position on the depletion allowance. I think you'll find there are factors which you haven't considered.

G. L. Farrar
Engineering Editor
The Oil and Gas Journal.

Aggravating the problem

"Rapid development in western Canada has been accelerated by government regulations designed to encourage a high level of exploration activity and the rapid development of reserves.

"Work obligations under leases and reservations of petroleum and natural gas rights, and government policy in offering proven reserves at auction, tend to maintain a high level of exploration and to accelerate the development of reserves without regard to available markets.

"In addition, the present system of prorationing to market demand assures an economic allowable to all new wells that are successfully completed, thereby reducing the available market for wells already producing. In order to maintain his present share of production, the operator has no alternative but to continue an active development program that will bring

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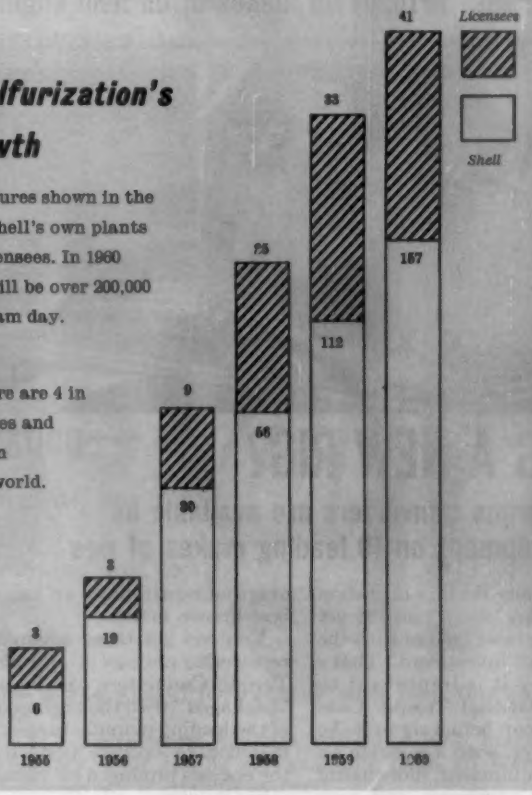
The capacity figures shown in the graph include Shell's own plants and those of licensees. In 1960 world volume will be over 200,000 barrels per stream day.

◀ Of 19 plants there are 4 in the United States and Canada and 15 in the rest of the world.

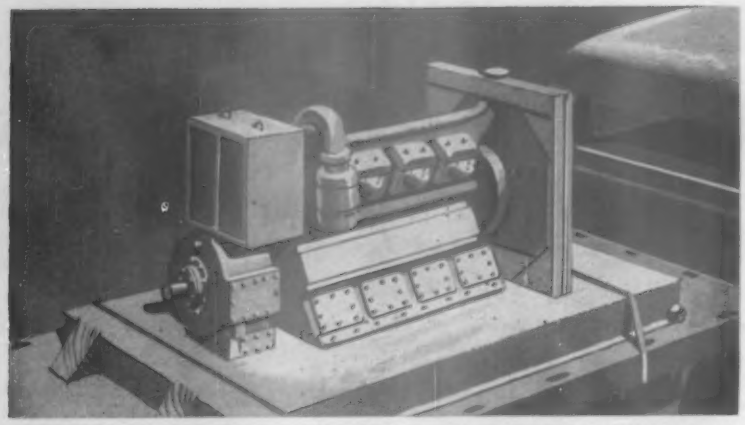


hydrodesulfurization

There is also available a Shell process for the vapor phase hydrodesulfurization of light fractions

Enquiries should be addressed:

For plant locations in U.S.A. and Canada to: Shell Development Company, 50 West 50th Street, New York 20, New York
Elsewhere to: Bataafse Internationale Petroleum Maatschappij N.V., 30 Carel van Bylandtlaan, The Hague, The Netherlands (P.O. Box 162)



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new wells into production to offset the reduction in allowable on producers.

"The interest that has been shown in recent months in exploring the subarctic regions of Canada is a good example of the type of industry activity that—if successful—might lead to further aggravation of the present situation of oversupply.

"This sort of exploration activity is essential, provided it is considered in its proper light as a long-range program, aimed primarily at mapping our potential oil-bearing lands against the day when economic markets can be found for oil discovered in these areas . . . The day when this oil can be economically marketed seems remote."

E. D. Brockett, president, British American Oil Co., Ltd., in a speech to the Empire Club of Canada, Toronto.

$2.07 a barrel in taxes

"An expression of the taxes generated by domestic petroleum production provides an indication of the large current tax load on the industry.

"In 1958, excise taxes alone amounted to about $1.44 per barrel of domestic consumption of petroleum products.

"Income tax payments on oil and gas production by producers and royalty owners are calculated to amount to 42 cents per barrel of domestic production on a typical operation that merely offsets depletion by the development of a corresponding amount of new reserves.

"Severance and other local taxes on production are estimated to average 21 cents a barrel.

"The total of these levies provides a minimum estimate of $2.07 as the tax revenue generated by a barrel of domestic crude oil production, not counting the indirect revenue created by other related activities of drilling. refining, transportation and marketing."

Richard J. Gonzalez, Humble Oil & Refining Co., in a paper presented to the House ways and means committee.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

DECEMBER

1-2 Western Petroleum Refiners Association, second computer conference, Hotel Tulsa, Tulsa.

3 Southern Gas Association, transmis-

another first from Western research

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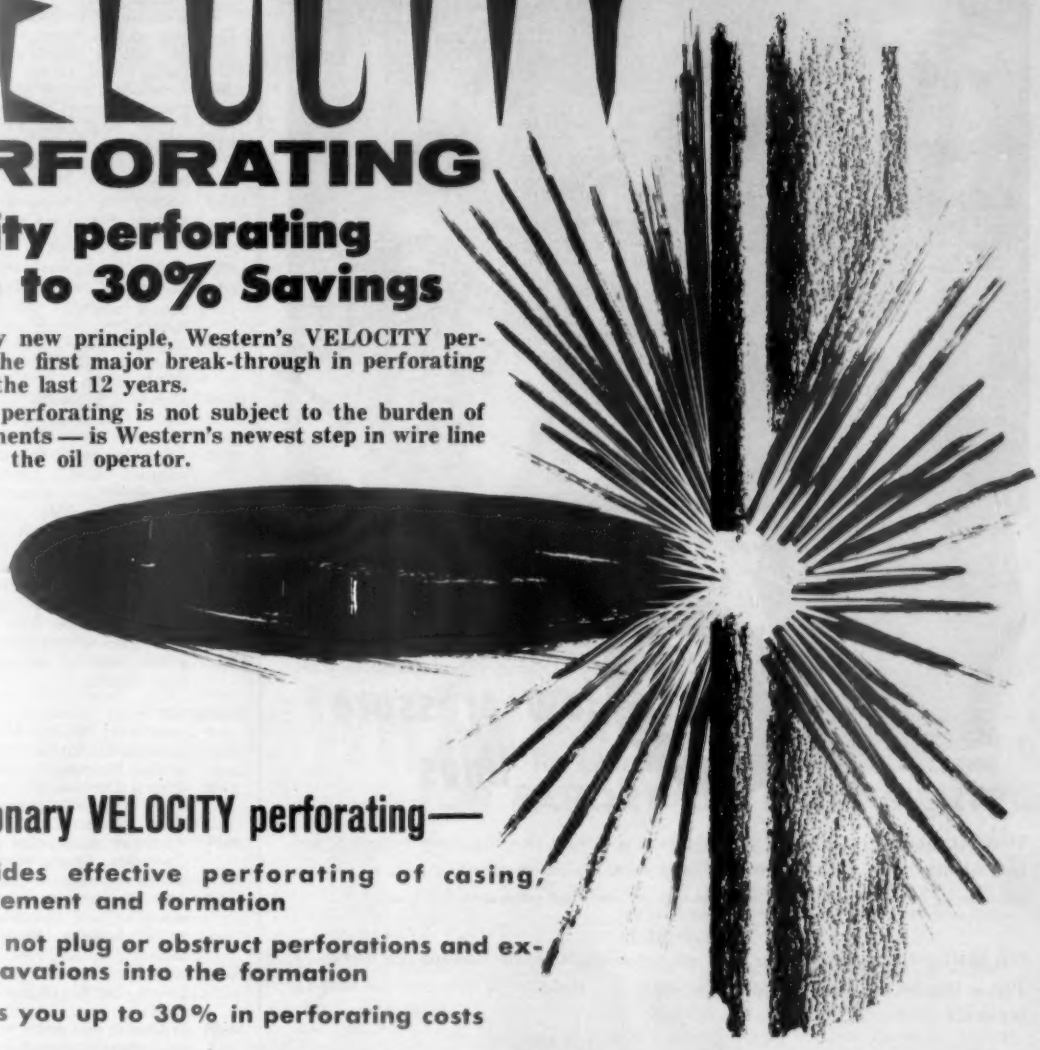
Quality perforating at up to 30% Savings

A completely new principle, Western's VELOCITY perforating is the first major break-through in perforating methods in the last 12 years.

VELOCITY perforating is not subject to the burden of royalty payments — is Western's newest step in wire line economy for the oil operator.



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A0-3 59

sion section, round table conference on construction cost estimates, Sheraton-Dallas Hotel, Dallas.

3-5 American Chemical Society, southwest regional meeting, Baton Rouge, La.

3-5 Interstate Oil Compact Commission, annual meeting, Sheraton Hotel, Philadelphia.

4 Southern Gas Association, transmission section, round table conference on pipeline engineering, Sheraton-Dallas Hotel, Dallas.

6-9 American Institute of Chemical Engineers, annual meeting, Sheraton Palace Hotel, San Francisco.

10-11 Mid-Continent Oil and Gas Association, annual ad valorem tax forum, Baker Hotel, Dallas.

11-15 Society of Automotive Engineers meeting, Sheraton-Cadillac and Statler Hotels, Detroit.

JANUARY

11-15 Society of Automotive Engineers, annual meeting, Sheraton - Cadillac Hotel, Detroit.

15-16 Association of Oilwell Servicing Contractors, annual meeting, Baker Hotel, Dallas.

17-19 Kansas Oil Men's Association, annual convention, Broadview Hotel, Wichita.

18-20 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville.

22 Natural Gasoline Association of America, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.

25-28 Plant Maintenance and Engineering Show, produced by Clapp & Poliak, Inc., Convention Hall, Philadelphia.

31-Feb. 3 Pipe Line Contractors Association, annual meeting, Ambassador Hotel, Los Angeles.

FEBRUARY

1-5 Instrument Society of America, instrument-automation conference and exhibit, Houston Coliseum, Houston.

8 Alberta Division of Canadian Petroleum Association, annual meeting, Hotel Palliser, Calgary.

8-10 American Association of Petroleum Geologists, Rocky Mountain section annual meeting, Billings, Mont.

14-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Statler-Hilton and McAlpin hotels, New York.

21-24 American Institute of Chemical Engineers, meeting, Biltmore Hotel, Atlanta.

24-25 Wisconsin Petroleum Association, annual convention and exhibit, Schroeder Hotel, Milwaukee.

24-26 National Association of Corrosion Engineers, Tulsa section, eleventh annual corrosion short course, Mayo Hotel, Tulsa.

26 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

26 Ohio Oil and Gas Association, winter meeting, Deshler-Hilton Hotel, Columbus, Ohio.

MARCH

2-4 American Petroleum Institute, Division of Production, southwestern district meeting, Statler-Hilton Hotel, Dallas.

7 Canadian Petroleum Association, annual general meeting, Hotel Palliser, Calgary.

14-18 National Association of Corrosion Engineers, sixteenth annual meeting, Memorial Auditorium, Dallas.

16-18 American Petroleum Institute, Division of Production, southern district meeting, Hilton Hotel, San Antonio.

18 Natural Gasoline Association of America, Oklahoma regional meeting, Biltmore Hotel, Oklahoma City.

21-23 Midwest Gas Association, annual meeting, Hotel St. Paul, St. Paul.

24-25 New England Gas Association, annual meeting, Hotel Statler-Hilton, Boston.

28-30 Western Petroleum Refiners Association forty-eighth annual meeting, Hilton Hotel, San Antonio, Tex.

30-Apr. 1 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita.

APRIL

3-8 Engineers Joint Council, sixth nuclear congress, New York.

4-7 Oil Heat Institute of America, annual convention, Park - Sheraton Hotel, New York.

4-7 National oil heat and air-conditioning exposition, Coliseum, New York.

5-7 Instrument Society of America, national chemical and petroleum instrumentation symposium, Rochester, N. Y.

12-14 Petroleum Industry Electrical Association, Petroleum Electric Supply Association, conference and exhibition, Municipal Auditorium, Kansas City.

19-21 University of Oklahoma, College of Engineering, southwestern gas measurement short course, north campus, University of Oklahoma, Norman.

20-22 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone, Henning, and Townsend hotels, Casper, Wyo.

20-22 National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland.

21-23 Society of Economic Paleontologists and Mineralogists, Permian basin section annual meeting and field trip, Abilene, Tex.

24-26 Independent Petroleum Association of America, midyear meeting, Denver Hilton Hotel, Denver.

25-27 Southern Gas Association, convention, Buccaneer and Galvez hotels, Galveston.

25-28 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, annual meeting, Chalfonte - Haddon Hall, Atlantic City, N. J.

25-29 American Welding Society, annual meeting and welding exposition, Los Angeles.

27-29 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

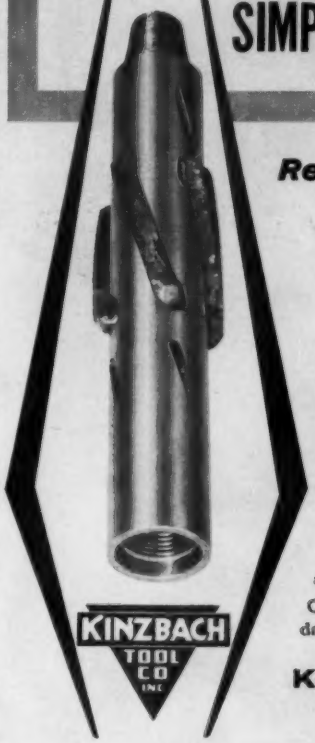
28-29 American Petroleum Institute, Division of Transportation, pipeline conference, Mayo Hotel, Tulsa.

MAY

1-4 American Petroleum Institute, Division of Transportation, tanker conference, Seaview Country Club, Absecon, N. J.

2-3 Society of Petroleum Engineers of AIME, North Texas section, fourth biennial secondary recovery symposium, Wichita Falls, Tex.

5-6 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual joint meeting of Rocky Mountain petroleum sections, Calgary.



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This versatile tool is designed to use three different types of blades: as a string guide (Model 166) it uses soft steel blades; as a stabilizer (Model 167) it uses hard surfaced blades; as a reamer or mill (Model 168) it uses tungsten carbide faced blades.

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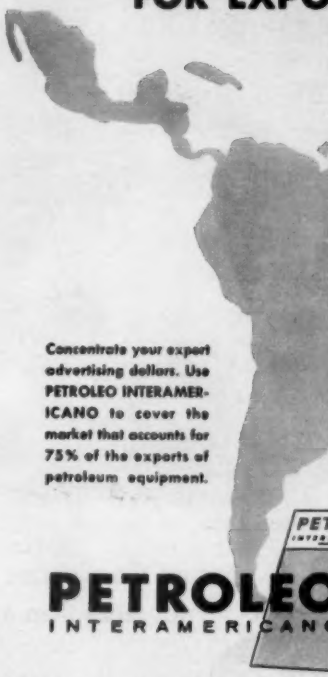

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ABP ABC

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for more than a quarter century"

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the Journal said...

50 years ago

December 6, 1909

United States Circuit Court at St. Louis hands down decision in famous and long-drawn-out Standard Oil Co. dissolution case ordering that all stocks in subsidiary companies held by Standard Oil Co. of New Jersey, as parent company, be returned to the various companies.

Widespread properties of Waters Pierce Oil Co. sold on court order at public "outcry" at Austin, Tex., to Col. Sam W. Fordyce, St. Louis capitalist and sole bidder, for $1,431,741.78, subject to $3,500,000 outstanding balance on $5,000,000 mortgage. John Sealy, Galveston financier, is sole bidder for properties of Security Oil Co. of Beaumont, Navarro Refining Co. of Corsicana, and Union Tank Line Co.

25 years ago

November 29, 1934

Sharp upturn in drilling felt in most parts of country after long period of decline. New Fitts field in Pontotoc County, Oklahoma, stirred with completion of well with record high hourly oil flow totaling 2,389 bbl. in 3 hours.

Standard Oil Co. of California reveals plans for $7,000,000 general expansion and modernization program to be completed within 6 months. Project includes 12½-in. pipeline from Rio Bravo area in Kern County to tidewater at Estero Bay.

Congressional (Cole) subcommittee studying oil conditions in country ends week-long Texas hearings and shifts activities to California, where Harry F. Sinclair is prime witness.

10 years ago

December 1, 1949

The Texas Co. formally opens newly built Eagle Point Works on Delaware Bay near Westville, N. J., as world's largest single refinery-construction project since World War II. New plant, a complete unit with capacity of 40,000 bbl. of crude daily, is Texaco's first on Atlantic Seaboard.

Eighty-six wells go off production in Long Beach Oil Development Co. area of Wilmington field following earth tremor. More than 120 wells may have to be redrilled because of damaged casing and jammed sucker rods.

Rank wildcat oil discovery by Mexican American Independent Oil Co. at 1 Tortuguero, in southern Vera Cruz in the Isthmus region of Mexico opens field with indicated area of 74,100 acres. Petroleos Mexicanos says new well flows 1,170 bbl. of light oil daily from 4,680-ft. sand.

JOURNALLY SPEAKING

A Drama in No Acts

Place: Any petroleum club, coffee bar, or street corner.
Characters: A couple of characters who get their living from the oil business.
Time: Most of the time.

"'Lo, Ike."

"'Lo, Mike."

"The oil industry sure has lousy public relations, hasn't it?

"Yup, it sure has."

"None of the guys in the oil business know anything about public relations."

"Nope, the poor boobs."

"Didja hear all the goofy ideas proposed at that public-relations meeting last week?"

"Naw, I didn't go."

"Neither did I."

"What's the use? They'll never get anywhere."

"That's what I say. They're just spinning their wheels."

"Trouble is, the public just doesn't understand the oil business."

"That's right. Somebody oughta set 'em straight. You'd think the newspapers would, but they're the worst of all."

"I'll say. Did ya see that lousy editorial on depletion in the paper last week?"

"Naw, I never read the editorials. They're too prejudiced. What did it say?"

"Made me so mad I didn't read it all. He was all fouled up, and you could see he didn't know beans about depletion. My wife suggested I write a letter to the editor explaining it."

"You gonna?"

"Hell, no. Think I want to stick my neck out in print? Those newspapers just don't want to understand."

"That's right. One of those damn fool reporters came around to interview me about our new plant the other day, and he didn't know from nothing."

"You didn't tell him anything, I hope."

"Course not. It's not my business to talk to newspaper reporters. Besides, if I'd told him anything he'd have misquoted it. I don't know where he got his dope, but his story was all screwed up when it came out. He didn't even know the difference between casing head and LPG."

"Imagine that. Like I just told you, the public just doesn't understand the oil business.

"How right you are. Did you hear about all those silly arguments on that gas bill up in Washington?"

"No. Where was that?"

"In the papers, I guess. Somebody was telling me about it. What those congressmen don't know about the gas business is pitiful."

"Tell you what. What the oil industry needs to do is to hire some high-powered guy to just sit up there in Washington and set those congressmen straight and tell 'em how to vote."

"Now you're talking. And he can start with our own congressman."

"Yeah. What's his name?"

"Oh . . . I forget. Doakes, or something like that, isn't it?"

"No . . . I sorta think he got beat a year or two ago and some other guy got the job."

"What's the difference? The new guy probably doesn't know anything about the oil business either."

"That just shows that the oil industry ought to do something about its public relations. I keep saying that all the time, but nobody does anything about it. You'd think they'd get hep to the problem after all this."

"But they don't. I suppose the next meeting of the public-relations committee will be the same old baloney."

"You can bet on it. I'm not going to waste my time with it."

"Me neither. Public relations isn't my business."

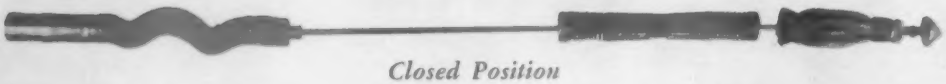
"So long, Ike."

"So long, Mike."

—Henry D. Ralph.

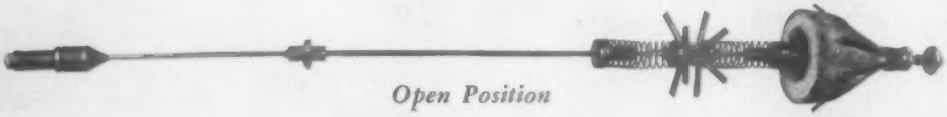
Another Through-Tubing Tool from Welex

Through-Tubing BRIDGE PLUG



Closed Position

Bridge Plug Case



Open Position

Welex has added a Through-Tubing Bridge Plug to its list of through-tubing completion services, now the most complete in the industry. The Welex Through-Tubing Bridge Plug offers these trouble-free, time-saving advantages:

1. POSITIVE SEAL. Design of the tool assures a positive seal. The Welex plug provides a base for the cement, holding it firmly in place until it sets.
2. ENTIRELY CASED. The Welex plug is entirely cased as it travels downhole, eliminating chances for premature setting or malfunction due to damage.
3. ONLY ONE RUN REQUIRED. Cement is carried into the hole and dumped on the same run the plug is set, reducing rig time or the period the well is off-production.
4. SMALL TOOL O.D. The OD of the Welex plug is 1-11/16", permitting use through standard 2" tubing.
5. REMOVABLE. The Welex plug may be removed from the well with acid. It is all aluminum except for the slips and packer springs.

Welex proudly adds the Through-Tubing Bridge Plug to its list of through-tubing completion tools which are already standards of the industry. Other through-tubing services which help make Welex the complete wireline service company include:

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Division offices in Denver, Houston, Los Angeles, Midland, New Orleans, Tulsa and Wichita.
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Stock levels: How much is too much?

HIGH INVENTORIES of crude and refined oils are currently blamed for the industry's price and market woes, but the debate boils down to a matter of opinion as to what is "desirable."

Last spring the heads of major companies gave the Texas Railroad Commission their estimates of the desirable national level of stocks as of November 1 (OGJ, March 30, p. 94). There was considerable opinion that these "desires" were unrealistically low, but nevertheless they came to be looked upon as specific objectives.

ACTUAL STOCKS in November totaled some 45,000,000 bbl. above the composite of last spring's desires.

Stocks of crude and kerosine, nationally, are below the desired levels, and no one seems to think they are too high.

Resid is above, but there has been fear of a shortage on the East Coast. A detailed check by the imports administrator reveals that East and Gulf Coast stocks are higher than had been supposed but lower than last year and presumably about right for anticipated demand. Resid stocks in California are probably excessive, but that condition is chronic and is less acute than formerly. So resid stocks nationally could be considered to be at about the right level.

Gasoline and distillate stocks are each some 20,000,000 bbl. above November desirables—nationally. But market conditions indicate that the excess of distillate is almost entirely on the East and Gulf Coasts, and the excess of gasoline chiefly in the interior (see page 134).

Such analyses show that national totals can give a distorted picture. But even taking product by product, region by region, or company by company, there is no agreement on a formula for determining when stocks are excessive, and no definition of a desirable level.

Attempts to set a yardstick have involved computation of days' supply, percentage relationship to demand growth, pipeline fill and similarly unavailable working stocks, flexibility and efficiency of the distribution system, and other less tangible factors.

HOW MUCH IS TOO MUCH? The answer lies in the market and in the judgment of those who supply it.

Stocks of any product are excessive in any place when their owners, for any reason, sell them below the market price.

The general fear is that when stocks are high some refiner will run more than he can sell in normal channels and will dump the surplus and break the market. But a refiner can do that even if his stocks are zero.

Gasoline and distillate stocks probably are excessive in some places. But current market conditions depend far more on how individual refiners handle their own runs and stocks than on how close national stock levels are to somebody's estimate of what is desirable.

FREFLO*— a mixture of oil-soluble chemicals designed to remove water blocks in oil and gas wells — by reducing surface tension, attacking interfacial tension and breaking emulsions. 10-gallon drum contains enough for 1000 gallons of treating solution. Available at Dowell stations.

CORBAN*— a complete line of polar-type inhibitors to combat corrosion in oil and gas wells. Available in a number of formulas and concentrations, in both liquid and stick form. Corban is supplied in 10, 20 and 50-gallon drums and in bulk lots at Dowell stations.

MUDBAN*— a non-acid, mud-dispersing agent for removing filter cake from the face of formations, for removing mud lost in formations, and for freeing stuck drill pipe. Recommended for clean-up treatments. Sold in 10-gallon steel drums at Dowell stations

GYPBAN*— a complex phosphate sequestering agent for prolonged protection from production-restricting gyp accumulations— in the formation and on well equipment. Non-toxic and oil-insoluble. Available at Dowell stations in 50-pound fiber cartons.

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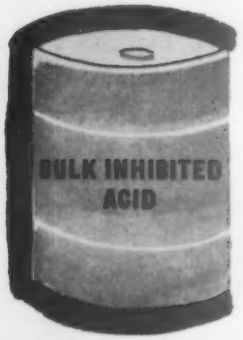
The Dowell label is your assurance of a quality product. For detailed information and prompt service, call any of the 165 Dowell stations and offices in the United States, Canada, Venezuela and Argentina. Dowell, Tulsa 1, Oklahoma.

*Dowell Trademark

JELFLAKE*— a fragmented, plastic foil added to drilling muds or cement slurries to prevent or stop lost circulation. Particles vary in size for more effectiveness. Packed in strong, wet-proof bags. Available at major mud distributors and Dowell stations.



BULK INHIBITED HYDROCHLORIC ACID — has many uses, including: cleaning scale and gyp from producing formations, tubing and lead lines; cleaning scale from piping, engine jackets, heat exchangers, valves and fittings; dump-job treatments in old wells. Supplied in bulk lots at Dowell stations.

POLYDRIL*— an organic, water-soluble polymer used in clear water drilling for rapid settling of solids. It has increased drilling rates and bit life, and lowered mud costs. Supplied in a semi-liquid, easy-to-use state. Polydril is available at Dowell stations in 5-gallon cans.

PARAFFIN SOLVENT — a non-chlorinated, concentrated, oil-soluble chemical solution designed to dissolve paraffin, even when complicated by asphalt, salt, sand, gum, or wax. Packed in easy-to-handle 10-gallon steel drums. Sold at Dowell stations and major supply stores.

Texas Production Should Rise in '60

- **Thanks to big withdrawals from stocks during the past 2 years and limited production due to low allowable, more oil should flow from the Lone Star state during the next year.**

TEXAS has been steadily losing its percentage of the domestic oil market since 1951.

But most petroleum economists tell the Journal they expect the state next year will change this trend and record an increase in the number of producing days.

Only last week the Texas Railroad Commission boosted the December allowable production by 131,166 bbl. daily by increasing the producing days from 9 to 10. This is the first increase in allowables in 5 months. It means December production will average 2,904,625 bbl. daily.

1960 outlook . . . The brighter projection for Texas in 1960 is based on facts and assumptions.

The first major fact to keep in mind is why Texas has been producing a declining percentage of total crude over the past few years.

This has not been due to any decline in producing capacity. It has been due to an attempt to prevent economic waste by holding national production near actual demand for domestic crude. Texas producers thus have sacrificed part of their market in order to prevent price chaos.

The percentages tell the story. For 1955, Texas accounted for 42.4% of total crude production. The ratio gradually has declined to 38.4% for 1958 and is estimated at 38.1% for this year.

Texas may not improve this percentage much in 1960, but, even so, the state's oil operators are expected to enjoy an increase in the volume they produce. Economists expect production to climb faster than demand during the year because of the excellent position of current stocks.

Demand picture . . . The general range of gains in demand forecasts being worked up for 1960 by petroleum economists is from about 2.7% to better than 4%.

More of the projections, however, are above 3.5% than are below.

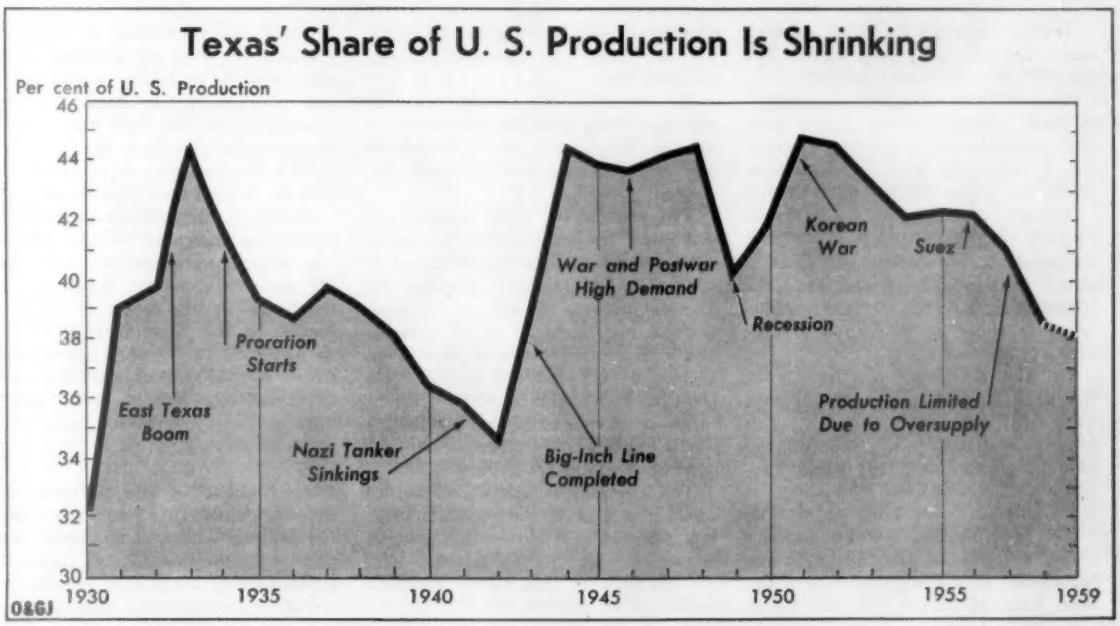
Demand in the last half of this year was held down by the general slowdown in the economy associated with the steel strike.

Despite this slowing trend in the third quarter, petroleum demand probably will mark up a gain of almost 4.9% for the year.

Part of this good showing, however, can be credited to the poor showing for the 2 preceding years. Domestic demand gained only 0.4% in 1957 and 2.8% in 1958.

The 1957-58 situation actually was set up in the year previous when new supply was excessive in both 1956 and 1957. This resulted in sharp additions to inventories during both years, sending stocks rocketing by 66 million barrels in 1956 and 61 million more in 1957.

It took 2 years to work off this stock surplus. The industry made the big cut in 1958 by holding the line on production and using inventories to meet demand. This accounted for a 51-million-barrel withdrawal from



stocks. This year total inventories probably will be cut by about 60,000 bbl. daily or near 22 million barrels for the year.

This will allow production in 1960 to show a better gain than demand. But a word of warning: Stocks at the end of this year probably will be low enough for near normal operations but not so low that large additions to inventories will be necessary in 1960.

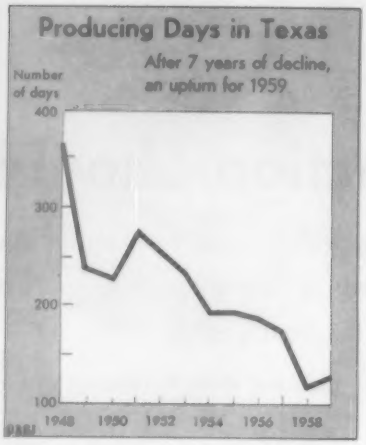
Supplies . . . If operations for 1960 are projected without a major change in total inventories, a supply gain of 4.2% is indicated.

This compares with a 3.6% increase in total demand and 3.9% gain in domestic demand for 1960.

This gain in new supplies will be shared by imports with a moderate 1.1% increase and domestic production with a 4.9% increase.

On the domestic scene, gas-liquids production probably won't repeat in 1960 its big percentage gain of 7.9% enjoyed this year. The 1959 gain is calculated from a very low base in 1958. So the gain for next year is estimated at 4.7%.

This will allow domestic crude production to show a gain of as much as 5% in 1960.



Texas outlook . . . With this much gain for crude production in sight, Texas should share in the boost.

The Lone Star State is expected to account for 38.1% of total U. S. production this year. That same percentage in 1960 should give the state a production rate of about 2,821,000 bbl. daily. The average this year is expected to be 2,685,000 bbl. daily.

Any percentage gain for Texas' share of the market will add to its expected production increase. In fact, the state could even lose a percentage point and come up with an increase in 1960.

Here's a breakdown on what Texas would produce in '60 based on certain percentages of the market:

% of U. S. output	Bbl. daily
37	2,740,000
38	2,814,000
39	2,887,000
40	2,962,000
41	3,036,000
42	3,110,000

The hearing . . . Most of the major oil companies appearing before the Railroad Commission favored a 10-day production schedule in Texas for December.

Representatives requesting the 10-day rate were from Atlantic Refining Co., Mobil Oil Co., Sinclair Oil & Gas Co., Sun Oil Co., Texaco Inc., Standard Oil of Texas, Philips Petroleum Co., and Cosden Petroleum Corp.

Favoring the 9-day schedule were

Product Stocks Mystery: Where's Surplus?

- That's the puzzler facing the Texas Railroad Commission. Although the stocks are about 57,000,000 bbl. over desired level, no surplus showed up in figures submitted by 12 major buyers.

THE DOMESTIC oil industry seems to have misplaced about 57,000,000 bbl. of product stocks!

This, at least, is a sort of tongue-in-cheek conclusion the Texas Railroad Commission might draw following a perusal of stocks figures submitted by major Texas crude buyers.

Though product stocks tower roughly 57,000,000 bbl. over the total indicated as desirable for this time of year by the industry in reports to the commission last March, the surplus failed to show up in company testimony November 20.

On the contrary, a rundown of figures submitted to the commission show that the Texas buyers, as a group, are 616,000 bbl. short of the gasoline storage level they would prefer and about 683,000 bbl. short of other products (see table on p. 41).

The companies reported holding 87,491,000 bbl. of gasoline in storage November 1 as compared with a desired level of 88,107,000 bbl. Other products in storage totaled 143,853,000 bbl. as against a desired level of 144,536,000 bbl.

As expected, the companies also reported being under desired levels of storage for crude oil—137,764,000 bbl. actual as against 137,874,000 bbl. desired.

The request for stock reports was prompted by commission frustration over a situation in which it found itself unable to raise the allowable, due to heavy surplus product stocks, even when it had managed to cut national crude inventories below desired levels by holding the allowable line at a low level for many months.

Texas adhered to a low 9-producing-day schedule in November for the fifth consecutive month.

The companies reported stocks of crude and four major products totaling 369,108,000 bbl.—which would be about 53% of the national total of 702,000,000 bbl. This excluded stocks of Texaco Inc.

Since the concensus of company testimony showed no product surplus whatever, it is highly unlikely that the commission can draw any conclusions from this data that will be of any great benefit to it.

The commission, it appears, can take its choice of two conclusions:

Either the desired stocks levels for November indicated by the industry last March were unrealistically low. Or some companies have adjusted their own desired levels of stocks in barrels in the November 20 reports to better fit their actual stocks positions. Individual-company stocks situations last March were reported only in days' supply—so there is no way to compare the two.

Data withheld . . . Thirteen companies that buy crude in Texas testified at the hearing. And twelve of them complied with the commission request to furnish stocks figures in barrels.

Sole exception was Texaco which

Indiana Oil Purchasing Co., Shell, Gulf, and Cities Service.

Humble Oil & Refining Co. was the lone company nominating 11 days.

Humble's Carl Shaver told the commission that his company in November has been buying all the oil it can get its hands on in the spot market. But buyers still have been unable to get all the Texas oil it needs.

Humble, he said, has been buying 76,000 bbl. daily on the spot market this month. It would need this much and 23,000 bbl. more in December on an 11-day pattern. On 10 days, it would need to buy a total of 129,000 bbl. daily on the spot market.

Louisiana problem? . . . William J. Murray, Jr., commission member, queried J. C. Edwards, of Texaco Inc., on the company's net imports of Louisiana oil into Texas.

Murray referred to a letter he had received from Maston Nixon, Southern Minerals Corp., that net shipments from Louisiana to Texas had risen to 240,000 bbl. daily. This compares with such shipments 2 years ago of up to 70,000 bbl. daily.

At the same time, Murray said, Louisiana has been hiking allowables while Texas has cut back by 200,000 bbl. daily.

ALLOWABLES BY DISTRICTS

District—	December	Increase over Nov. 7
1. Southwest	53,919	1,107
2. Gulf Coast	118,618	6,834
3. Gulf Coast	378,664	14,802
4. Southwest	192,325	7,690
5. East Central	30,915	1,304
6. Outside East Texas field	118,466	6,012
6. East Texas field	142,879	7,744
7-B. N. Central	162,492	6,626
7-C. W. Central	143,067	6,943
8. West Texas	1,150,807	62,715
9. North Texas	278,096	6,835
10. Panhandle	134,377	2,554
TOTAL	2,904,625	131,166

Edwards said he didn't know what Texaco's imports of Louisiana oil were but thought they were substantial. Murray asked that he get those figures for the commission and to report whether these imports were due to Texaco's inability to get Texas crude.

Nixon's letter, Murray said, declared that Texas refineries were down to runs at 75.6% of capacity, while those in Louisiana were operating at an average rate of 95% of capacity.

Go-slow urged . . . Jake L. Hamon, representing a group of about 40 independent operators in the Dallas area, urged the commission to hold the line at 9 days for December.

Hamon said his group feels the same factors that have influenced the commission to hold the 9-day pattern for so long — namely, high product stocks—are still around.

And there is a good possibility that the steel strike may be resumed, thus chopping a large chunk of demand off the industry's fuel-oil market.

Also, Texas is faced with the fact that only one purchaser (Humble) is taking all oil in excess of nominations. "Should that firm have a fire, a strike, or some other trouble, we could quickly get into a wreck."

Hamon said Dallas producers could find no crude in Texas that currently is without a market. But it is a fact, he said, that a higher percentage of marketed oil all the time is forced to reach its market by truck.

Report by 12 Companies on Stocks . . . made to the Texas Railroad Commission

(Millions of barrels)

Company—	CRUDE Actual Nov. 1	CRUDE Desired Nov. 1	CRUDE Difference	GASOLINE Actual Nov. 1	GASOLINE Desired Nov. 1	GASOLINE Difference	OTHER PRODUCTS Actual Nov. 1	OTHER PRODUCTS Desired Nov. 1	OTHER PRODUCTS Difference
Atlantic	8.2	8.3	−0.1	3.09	3.07	+0.02	9.8	9.8	.....
Cities Service	8.552	8.750	−0.198	6.323	6.250	+0.073	11.924	12.075	−0.151
Gulf	12.6	13.5	−0.9	12.5	12.3	+0.2	25.5	25.4	+0.1
Humble	14.0	14.5	−0.5	3.3	3.5	−0.2	4.6	4.7	−0.1
Indiana	31.875	31.0	+0.875	15.82	17.6	−1.78	16.675	17.3	−0.625
Mobil	17.529	17.741	−0.212	10.667	10.433	+0.234	23.681	22.935	+0.746
Phillips	4.042	4.2	−0.158	7.789	7.5	+0.289	8.018	9.1	−1.082
Shell	17.5	15.9	+1.6	14.6	13.9	+0.7	24.5	24.3	+0.2
Sinclair	14.8	15.0	−0.2	7.534	7.5	+0.034	14.453	14.450	+0.003
Standard of Texas	0.768	1.0	−0.232	0.529	0.575	−0.046	0.428	0.422	+0.006
Sun	7.483	7.483	.....	4.479	4.479	.....	3.599	3.379	+0.22
Cosden	0.415	0.500	−0.085	0.860	1.0	−0.140	0.675	0.675	.....
TOTALS	137.764	137.874	−0.110	87.491	88.107	−0.616	143.853	144.536	−0.683

advised the commission by letter that it considers its inventory as expressed in barrels to be confidential, thus was submitting its stocks situation only in days' supply.

E. O. Thompson, commission chairman, told J. C. Edwards, representing Texaco, that the commission needed barrels figures to help it ascertain the demand for Texas crude. If these figures are not forthcoming, Thompson said, the commission would issue a subpoena for them. Texaco later notified the commission that it would file its stocks figures in barrels.

William J. Murray, Jr., another commission member, pointed out that other companies also were reluctant to give figures in barrels but that they did so anyhow.

Edwards questioned the significance of the figures obtained by the commission in that they did not represent nearly all the stocks held over the nation. He was assured that the commission feels they are significant.

Murray offered the following explanation: According to available figures, stocks have been running 50,000,000 to 70,000,000 bbl. over desirable levels. In an effort to hold to desired levels, he said, "Texas has seen its share of the market decline steadily. And the commission is seeking to find if the desired level figures have been in error."

Californians Fight for Lower Imports

. . . from foreign sources. Independents amass statistics to show Government that high quotas hurt the industry.

CALIFORNIA'S four leading independent producers associations have banded together in a fight to reduce the volume of foreign oil imports into the western states.

All the independents claim imports still are excessive and are depressing the West Coast oil industry.

The group is composed of the Oil Producers Agency of California, California Stripper Well Association, Independent Oil Producers Agency, and San Joaquin Valley Oil Producers Association.

The four plan to make a joint representation to the Government seeking immediate relief from the "economy-wrecking foreign oil imports."

A statement announcing formation of a committee from members of each organization charged that import controls have failed to accomplish their purpose in District 5. To prove the full extent of this, the new group circulated a questionnaire to find the amount of shut-in production, crude contract cancellations, and price cuts of each company recently.

While the survey is being made, a special committee will study ways and means of making a joint plea for help from the Government.

One on record . . . The new group hasn't revealed any definite plans, or made any specific recommendations.

But one of the group has been in the forefront of those battling for a lower quota for the district. The Oil Producers Agency, headed by Richard R. Von Hagen of the Lloyd Corp., recently released a lengthy report detailing its stand and making recommendations. In all probability, the new combined group will take much the same tack.

In its statement to the Oil Import Administration recently, the Agency pointed to the plight of the industry in California by showing that:

. . . **Well completions** for the first half of 1959 were down from the same 1958 period from 525 to 470.

. . . **Production** was down from the first half 1958 average of 862,000 bbl. daily to around 840,000 bbl. daily for the first half of this year.

. . . **Oil field employment** was off from 24,800 the first half 1958 to 23,200 in the first half this year.

. . . **Crude prices** were down as much as 90 cents a barrel in postings in the past year with an estimated 60,000 to 70,000 bbl. going at discounts up to 70 cents a bbl. below postings.

These figures, the OPA charges, point to the failure of the import quota to preserve and maintain a healthy and vigorous domestic industry in the interest of national security. The price reductions and lowered producing rates have resulted in serious harm to the industry in California, the agency charged.

The agency also pointed out the importing companies themselves have made it obvious that quotas are too high by failing to bring in their allowable since the quotas were established. Specifically, importers failed to come up to their quotas by 54,000 bbl. daily for the first half of 1958, 18,000 bbl. daily for the last half, and were 20,000 bbl. daily under the first half of this year.

"Since importing companies have never even reached the quota, it is obvious that the quota has been greater than the difference between domestic supply and demand. That being the case, the program has not reached its established fundamental objective.

"Furthermore, since imported oil is available in larger volumes than the importing companies can use, there's no incentive for them to maintain a market for crude produced in California," the statement charged.

New quota asked . . . The Oil Producers Agency, speaking for itself and not the new alliance, asked that import quotas for District 5 for the first half of 1960 be set at 269,000 bbl. daily, including Canadian imports (See related story, p. 50).

They arrived at this figure by pegging domestic supply in the district at 1,113,000 bbl. daily against a probable demand of 1,382,000 bbl. daily. Subtracting the present quota of 7,000 bbl. daily for products leaves a 262,000-bbl. quota for crude and unfinished oils.

Here's how the Agency breaks down its demand estimates:

. . . **Civilian demand.** Pegged at 1,150,000 bbl. daily, an increase of 6% over the first half of 1959 which in turn experienced a 6% increase over the first half of 1958.

. . . **Military and Pacific foreign.** Up somewhat as the military's stock reduction program has been completed. Pacific foreign demand carried forward at about current rates.

. . . **Intercoastal, Atlantic foreign.** These will be substantially reduced and Atlantic foreign demand eliminated. These shipments, the OPA pointed out, always occur as distress shipments in times of surplus and don't reflect normal demand. As a matter of fact, recent increased intercoastal and Atlantic foreign shipments merely add further proof to the existence of surpluses in District 5 which in turn reflect excessive imports. These shipments should not be considered in totaling the District 5 demand figures, the agency said.

Conoco MGM Test Is a "Star"

CONTINENTAL Oil Co. has confirmed a 720-bbl. producer within 150 ft. of Metro-Goldwyn-Mayer's sound stage in Culver City, on Los Angeles' west side.

Conoco said the discovery well means a promising new field in the thickly settled residential and industrial area.

The MGM No. 1 tested at a daily rate of 720 bbl. through a restricted choke. It was completed on temporary equipment to a total depth of 8,807 ft. Unofficial reports credited it with 125 ft. of pay between 8,000 and 9,000 ft.

The well was drilled by Continental on Loew's, Inc., MGM studio lot adjacent to sound stage while the filming of a movie was in progress. Soundproofing of the drilling rig prevented interference with moviemaking.

Continental said the producing interval of the MGM No. 1 is different from and unrelated to any producing sand in the nearby prolific Inglewood field (OGJ, Nov. 2, p. 68).

In addition to the 100-acre MGM lease, Continental has another 750 acres in the immediate vicinity under lease, most of it in light industrial areas and residential lots. Conoco didn't reveal any development plans beyond the discovery well. But with drill sites difficult to obtain in town-lot drilling, it has been the practice of town-lot operators to drill a number of wells from one site.

Alaska's Oil Exploration Heads Offshore

- First tidelands lease sale set December 10. State is packaging tracts in attractive sizes and locations.

ALASKA'S first sale of offshore oil leases scheduled in Anchorage December 10 is being designed to give the small oil operators an even break with the majors.

State land officials said they purposely have kept the tracts offered for bids small enough so that independents would be able to bid.

Many oil men nominated for the maximum 5,760-acre tracts. The largest block being offered, however, is 3,760 acres, and others range downward in size to 640 acres.

All of the 87,981 acres nominated earlier by interested oil companies are being offered in 32 tracts. Although the tract sizes were reduced, external boundaries of the nominated blocks were retained.

Location . . . The leases offered lie along the west coast of Kenai Peninsula in the upper reaches of Kachemak Bay and under Wide Bay on the east coast of Alaska Peninsula.

The blocks form a narrow band along the coast. This will permit operators to drill them from onshore locations.

Details of the sale include:

. . . Sealed bids must be offered.

. . . No minimum bids are set, but the state reserves the right to reject any or all bids in the best interest of the state.

. . . Payment totaling all the cash bonus offered plus one-fifth of the first year's rental must accompany the bid.

. . . Bids must be submitted before 1:30 p.m. December 10 to Director of the Division of Lands, Anchorage, Alaska. Tract maps and full information on offerings may also be obtained at the land office.

Other sales . . . Oil companies, meanwhile, are pressing for the state to open up other tideland areas along the Gulf of Alaska.

Roscoe Bell, director of the Division of Lands, however, reported that state officials will first study results of next month's first sale before putting more land on the block.

They will plan as many sales as economically feasible because they look to such auctions to bolster sagging revenues from the inevitable lag in onshore oil leasing.

Alaskan officials thus are hoping the first state tideland sale will prove popular and profitable. The tracts are in areas where oil companies for several summers now have conducted various kinds of geophysical and geological surveys. The tracts off Kenai hold natural interest because of their proximity to the Swanson River field.

New Engine Has Only Two Moving Parts

A SIMPLIFIED lightweight engine which promises high efficiency and fuel economy was introduced last week by Curtiss Wright.

Moving parts in the radically new type of internal-combustion engine are confined to a roto and crankshaft.

The engine, developed by Curtiss Wright and NSU Werke of West Germany, gives greater efficiency and fuel economy than a jet engine.

The engine consists simply of a rotor operating in a combustion chamber with four lobes or sections. The rotor is mounted eccentrically on the crankshaft. Gas-air mixtures are fed to the chamber by a carburetor. As the rotor turns, the mixture is compressed and ignited by a spark plug.

Air-gas mixtures are admitted through an upper lobe in the chamber and exhausted through a port in a lower lobe. Three power sequences for each rotation of the crankshaft maintain a virtually continuous intake, compression, ignition, expansion and exhaust cycle.

A 100 hp. model was displayed at a press conference last week, but "for competitive reasons" complete details were withheld until full scale production is undertaken. The model, made of gray iron, weighed 100 lb. This could be cut in half by the use of aluminum.

Even with the gray iron model, the horsepower-weight ratio was far superior to that of the usual piston engine. Fuel consumption was said to be better than that of a piston engine and near that of a diesel.

According to the developers, models ranging from 100 to 700 hp. will be in production next year. They will be available for use in cars, boats, planes and industrial installations.

How Six-Grade Marketing Has Paid Off

• Sun says it is selling more gasoline with custom blending. And the company figures the higher octanes available from its six-grade pumps put Sun in a good position to meet any future increases in octane demands.

CUSTOM blending of gasoline at the pump is proving so profitable for Sun Oil Co. it plans to saturate its marketing area with the special equipment.

Sun's custom blending is now available in about 9,000 service stations in the U. S. and Canada.

Company plans call for very little expansion beyond the existing marketing territory concentrated in 22 states and the District of Columbia. But gasoline business in this region will be intensively developed.

The blending equipment, in the 18 months since it has been available to customers, has proved a real bell ringer. In the first 6 months, Sun marketing people discovered custom blending increased gasoline sales at about twice the rate enjoyed by the industry as a whole. This ratio is generally holding through 1959.

Sun stations also began attracting more than their normal share of the newer, high-compression automobiles. And now they are maintaining this popularity.

Customer reaction . . . Motorists have been quick to adapt the concept of fitting fuel to individual cars. Sun surveys reveal.

The drivers seem to match up pretty well the octane quality with their car requirements.

Surveys revealed that 74% of the motorists used the Sunoco 200 blend, a base grade of about 94 octane. And 9% of the motorists used Sunoco 210 of 95.4 octane; 6% used Sunoco 220 of 95.8 octane; 4% used Sunoco 230 of 98.1 octane; another 6% used Sunoco 240 of 99.5 octane; and only 1% used Sunoco 260 which has 102.2 octane.

These demand percentages follow very closely a curve similar in shape to the actual octane-requirement curve.

Dr. J. G. Moxey, Jr., assistant director of research and development for Sun, reported "these data seem to say the average motorist is doing a pretty fair job of matching the requirements of his car with the octane quality of the fuels that are made available to him.

"He does, however, seem to be buying somewhat higher quality than he actually needs," Moxey added.

Similar usage patterns emerge in stations having only two grades of gasoline or three grades, Dr. Moxey reported.

A survey in the eastern United States of stations selling only two grades of gasoline showed 68% of cars used the regular averaging 93.4 octane number. The remaining 32% used the premium at an average oe tane level of 99.6.

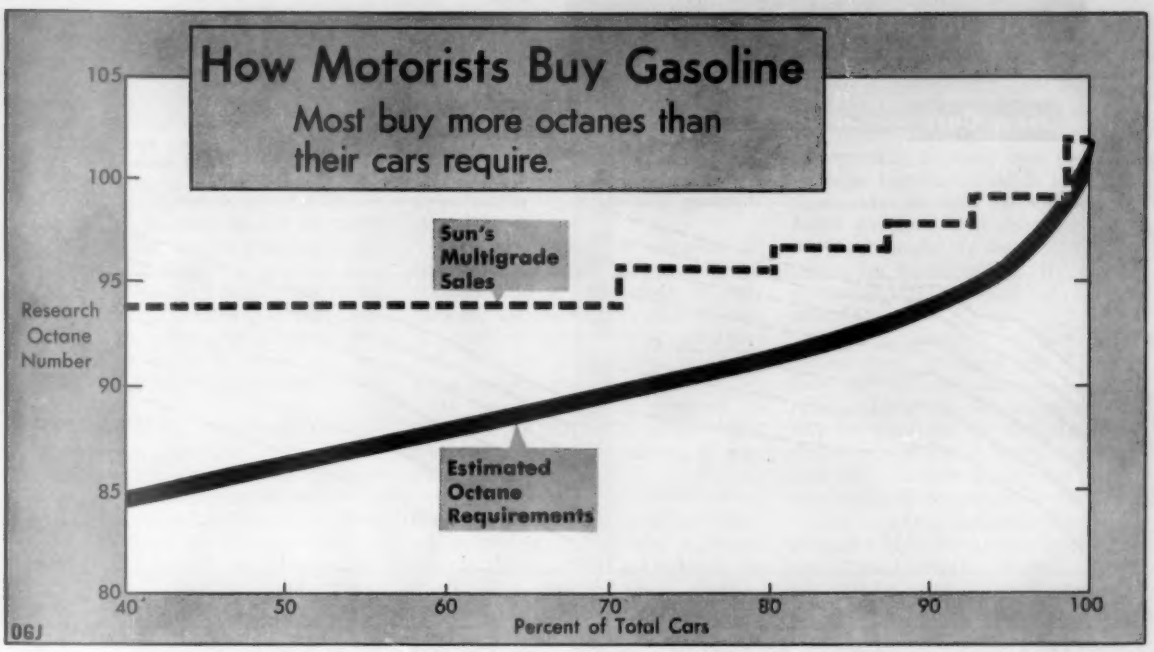
In stations selling three grades, 57% of the cars used regular, 37% the intermediate premium, and 6% super-premium.

This means that Sun's custom blending is a step further in an established trend which finds customers trying to fit the right gasoline to their engine.

The new gasoline . . . Sun currently offers six blends of gasoline with octanes ranging from 94 in the Sunoco 200 to 102.2 octane in the Sunoco 260.

Each blend is priced differently. The suggested price stepup is 1 cent per gallon for each grade in the first five grades and then 2 cents more per gallon for the top-grade gasoline.

The pricing schedule has advantages two ways:



for Sun Oil

How Customers Fit Fuels to Their Cars

Blend—	Octane Rating	Selector-Guide Recommendation	Actual Purchases
Sunoco 200	94.0	71%	74%
Sunoco 210	95.4	12%	9%
Sunoco 220	96.8	3%	6%
Sunoco 230	98.1	6%	4%
Sunoco 240	99.5	7%	6%
Sunoco 260	102.2	1%	1%

. . . **Sun and its dealers** get added income over what they would get from marketing the single Blue Sunoco grade. Before multigrade marketing, Sun stations sold only one grade of gasoline.

. . . **Customers have a money** incentive to pick the blend that fits their cars.

Sun marketing people claim this method of selling and pricing allows the motorist to save up to 4 cents a gallon with no loss in horsepower.

Gasoline shipments to distributors are now averaging about 90% basic grade Sunoco 200 and 10% octane concentrate. The ratio of concentrate is rising in line with projected forecasts as octane requirements of the total car population edge upward.

Sun provides a gasoline selector guide for its customers. It shows the lowest blend that gives smooth performance for each make and model of car since 1954.

Under the selector-guide recommendation, 71% of all cars would be satisfied by the 94-octane Sunoco 200; about 12% by Sunoco 210; about 3% by Sunoco 220; about 6% by Sunoco 230; about 7% by Sunoco 240; and 1% by the 102-octane Sunoco 260.

The custom blending is achieved by mixing the right proportions of product from two tanks. The mixing occurs at the nozzle.

Base of the mixture is Blue Sunoco 200, the 94-octane so-called regular gasoline. The right amounts of a 105-octane concentrate are mixed with Sunoco 200 to get the required octane ratings for the other five blends.

Flexibility of the blending system gives it a great future.

For the present, Sun is content to remain with the six grades. Its top Sunoco 260 with 102.2 research octane number appears to lead all the other superpremium fuels, bearing out Sun's claim to having the top octane.

The Wayne pump used by Sun has room for three more grades—a 250, 270, and 280. The top then could be straight concentrate of about 105-106 RON.

Thus as octane demand moves upward, Sun will be able to adapt without boosting the octane rating of either blend stock. When top requirements exceed 102 RON, higher blends can be added. But according to Sun's projections, this will not be necessary until some time after 1963. So far, Sun has made no changes in the octane rating of either blend stock since it started custom blending. Nor has there been any variation in octanes by geographical area.

Sun executives believe the custom blending pumps thus puts the company in a strong competitive position.

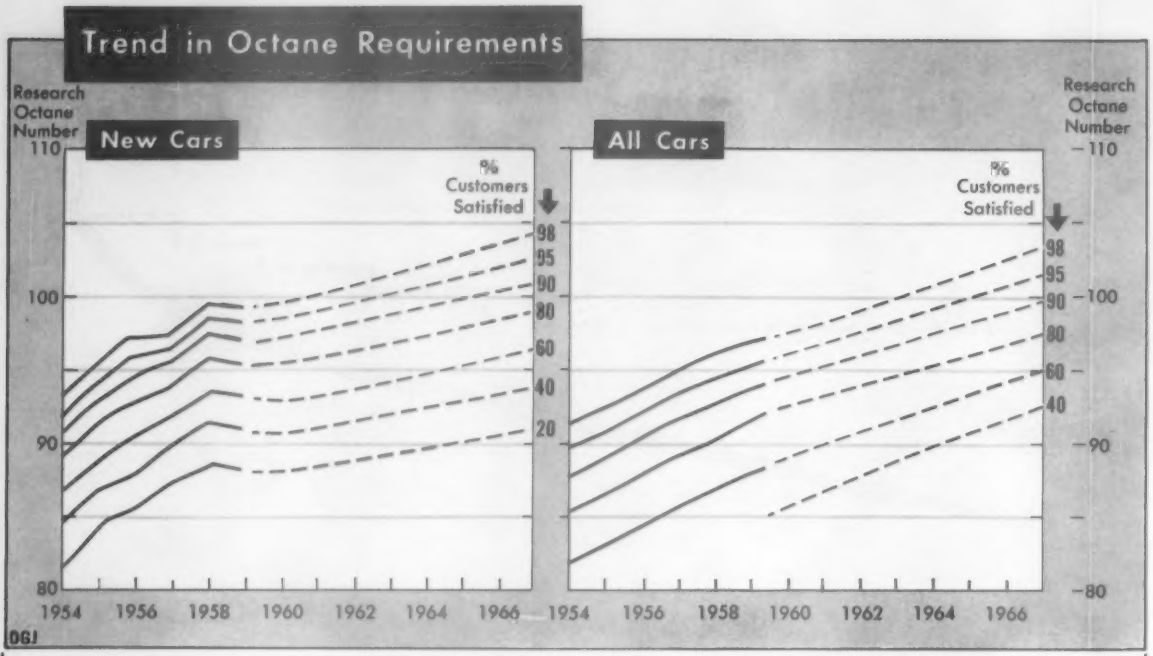
Operating experience . . . Sun is investing $30-$35 million in the new equipment.

The cost per average Sunoco station has been about $3,200, with an average of one and one-half pumps per station.

The average cost includes converting from a single-grade system to the blending system. This requires installing considerably more new underground storage than is required in a two-product or three-product system. However, about half of the cost of converting a station to custom blending goes into the new pumps.

Sun's $30-$35-million investment does not include cost of revamping the roughly 25% of Sun stations which are neither company owned nor under mutual options. Sun has helped independent distributors make the switch by lending them the required money on 5-year terms.

The blending system works like this:



Marketing executives of Sun Oil Co. feel the company's six-grade marketing plan will meet octane requirements for years to come.

At present, Sun's top grade, Sunoco 260, is rated at 102.2 RON, which will satisfy all needs until 1964. Then, Sun can add more grades to hit a top-grade gasoline offering 105-106 RON, which will meet any octane needs until 1967.

The island pump is connected with two storage tanks, one holding the basic Sunoco 200 and the other containing the concentrate. The line from each tank has a meter and pump on it. The amount of gasoline flowing through each is governed by a blend control valve which is keyed to the blend selector. The gasoline even flows through separate compartments of the hose and finally is mixed at the nozzle.

Sun reports maintainence costs on the blending pump have been no higher than with the conventional pump.

The explanation probably is that the blending pump actually combines two pumps, two meters, two lines, two totalizers, and a triple computer. The special design makes it possible easily to reach and remove assemblies in the pump for repairs in a shop rather than on the driveway in cold, rainy weather.

The gasoline coming from the pumps is unusually uniform throughout Sun's marketing region. In fact, tests conducted by the State of Florida on gasoline taken from Sun pumps show the actual octanes of the blends are very close to their target octanes.

Training program . . . Sun's initial training program for station operators on the blending pump consisted primarily of "dealer clinics."

These were conducted during the late winter and spring of 1958 for dealers and their helpers. They were geared closely to the blending pump installation program. The idea was to give the individual dealer a clear picture of the new system before the pump arrived.

Instructors at the small clinics emphasized the "why" of custom blending, how it works, how it can easily be explained to customers.

Dealers, in addition, were shown details of the pump's mechanism, information which will help them in their daily work of setting prices and check out sales.

Prior to the clinics, dinner meetings were held to unveil the new pump and give general information on installation plans. After the dealer clinics, special clinics were held for helpers of dealer stations.

A continuing, follow-up program now puts emphasis on:

. . . **Keeping dealers informed** on any changes occurring in car requirements and adaptability of custom blending to these changes.

Examples are requirements of foreign cars, the compact cars, and introduction of new models in the standard American cars.

. . . **Supplying salesmen** with current data on market research studies to pass along to dealers.

The basic manual for dealers is continually up-dated. The Sunoco Diamond, the dealer magazine, carries educational material including "success stories" of individual dealers. A special mailing piece called "The Blend Selector" is used to report new information and review problems.

. . . **Moving advertising** aids to dealers.

The outlook . . . At least three other gasoline marketers have either adopted Sun's multigrade marketing concept or have it under test.

Lion Oil Co. is conducting a 6 months' test in El Dorado, Ark., selling five blends ranging from 90 to 99.1 octane. So far sales at the six stations have increased from 9 to 10% (OGJ, Nov. 9, p. 112).

El Paso Natural Gas Products has installed custom-blending pumps at more than 30 of its stations in West Texas and plans to extend the system through its marketing area (OGJ, Aug. 24, p. 39). Hancock Oil Co. is blending nine grades from multigrade pumps from eight stations in southern Nevada.

But whether the idea of multigrade gasoline from a single pump becomes universal, Sun believes its system provides flexibility enough to meet any kind of competition.

Besides it builds sales by appeal to the preoccupation of present-day motorists with economy.

Map Makers Seek Protection

. . . against copyright violators, form watchdog group to prevent unauthorized reproduction of oil-industry maps.

SOME oil-industry map makers are teaming up to keep an eye on copyright violations and to push for prosecution of offenders.

A letter has gone out to map firms, blue printers, commercial reproduction offices, and to the oil companies announcing plans to form the Associated Publishers of Petroleum Cartography.

Purpose of the association, the cartographers say, is to:

"Discourage the growing practice of reproduction firms, individual oil operators, and major companies from piracy of maps by putting them on notice they are violating the copyright laws of the United States when they make unauthorized copies of copyrighted maps."

Need for tighter control, the map makers say, is due to the increased use of and the great improvements in reproduction machines now generally available.

They are hoping to organize all companies producing maps for the oil industry into a solid front. If they succeed, the association plans to hire its own investigators and attorneys and, through prosecution, minimize abuse of the copyright laws.

An association, they contend, is needed to do the job since individual map companies might hesitate to take issue with a client.

How it started . . . Discussions leading to the move followed a recent federal court ruling in Houston in which Judge Joe Ingraham reversed a decision of a federal court jury and ordered a defendant freed of a copyright violation.

Twenty aerial survey maps, made by Edgar Tobin Aerial Survey Co. of San Antonio and at one time property of Humble Oil & Refining Co., were reportedly sold. The base maps, valued at an estimated $4,000,000, were copyrighted by Tobin and sold to 107 clients and companies, with rights to reproduce for their own use.

Judge Ingraham held in a decision September 28 that the Government failed to show that the maps sold were not made by one of the 107 companies buying them. He granted a motion for acquittal of the defendant.

Legal departments of some companies have reviewed the Houston case and are not alarmed over the ruling. They feel the copyright laws still are adequate for full protection. However, some map makers fear the case may partially nullify the protection effect of copyrights.

Two mapping officials who have discussed need for the new association are Walter Duffard, Corpus Christi, and Chester H. Milliken, Fort Worth. Because oil maps are being constantly revised and changed, they present more of a copyright problem than do other types of geographic maps, in their opinion.

Pure Test Gives Paradox a Second Surprise

THE MOST important strike since Aneth is the tag being given to Pure Oil Co.'s Northwest Lisbon discovery in San Juan County, Utah.

The well first attracted industry attention with its big gas flow in the Mississippian a few weeks ago. Now Pure has recovered 7,500 ft. of clean, high pour point, 43.5°-gravity oil on test in the Devonian at 8,261-8,382 ft.

There is no Devonian production in the southwestern Rockies. Nearest Devonian oil is in Wyoming. Part of the drill-stem test at the Northwest Lisbon wildcat also was in Cambrian, another new pay for this entire region.

Location of the wildcat (Section 10-30s-24e) is in the northeastern section of the Paradox basin, about 23 miles north of Monticello on the north end of the Lisbon Valley-Dolores anticline. This anticline is one of a series of large salt-core anticlines mapped parallel to the east side of the basin, or the Uncompaghre uplift.

Very little drilling has been done in this portion of Paradox basin. Discovery of Mississippian gas in the wildcat—tested at 17,000 M.c.f. daily—gave Utah its second Mississippian producer. The first was at Big Flat 2 years ago. This summer Mississippian oil was found in a Texas Pacific test in Arizona's Apache County.

Future play . . . Successful completion of the Northwest Lisbon test in Mississippian and Devonian will give the Paradox basin an entire new section to shoot for in future exploration.

Pure already is drilling at Southeast Lisbon to the southeast of the discovery in San Miguel County, Colorado. The well has had Mississippian shows, but they've been less significant than at Northwest Lisbon.

The Northwest Lisbon discovery is causing a leasing stir throughout the northern Paradox basin area, both in Utah and western Colorado. It is by far the most important wildcat event in the Paradox basin since the discovery of oil at Aneth itself. There will be considerable exploration to the Mississippian and Devonian with the large salt-core anticlines as targets (OGJ, Nov. 23, p. 125).

Nebraska Commission Setting Up Shop

THE NEBRASKA Oil and Gas Conservation Commission, created by the last legislature, is moving toward regulation of production in the Cornhusker state.

The three-man commission has scheduled hearings January 12 in Sidney.

These hearings, says newly-appointed commission Director R. H. Rhodes, "probably" will involve the establishment of maximum rates of efficient production for some of the larger fields in Nebraska.

The conservation commission has regulatory power over production only insofar as physical waste of resources is involved. It can not fix production levels on the basis of market demand.

Coming into power little more than a month ago, the commission's main business to date has been laying the ground rules for its future operations.

However, it has taken two significant steps.

They are:

. . . Setting up a spacing pattern of one well to every 40 acres in new fields.

. . . Ordering a levy of 2 mills on every dollar of raw petroleum products in the state. The money, estimated to bring in about $10,000 to $15,000 monthly, will finance commission operations.

Who Will Pay the Gasoline Taxes?

• Jobbers have an option under the new federal law which kicked up the gasoline tax to 4 cents. Next week they'll tell revenue officials how to write the new rules.

WHO FORKS OVER the 4-cent gasoline tax to Uncle Sam after January 1 is a matter of principal concern right now to both refiners and distributors.

The revised federal gasoline-tax statute, which added 1 cent a gallon, gives the wholesale distributor a choice. He can:

... **Pay the refiner** when he buys gasoline, as he does now.

... **Pay direct** to the Internal Revenue Department when he sells the gasoline to retailers.

Some leading jobbers believe most of the 8,000 to 10,000 wholesale distributors will take advantage of the delayed payment because:

... **It will save** wholesalers from paying federal taxes on gasoline which might be lost through spillage, evaporation, fire, or other emergency before sale.

... **It will give them** use of funds now paid as advance taxes and tied up for weeks or months, depending on time of sale to retailers.

Some wholesalers estimate the nation's distributors will benefit by perhaps $8,000,000 annually as a result of the option. But the change will not be without cost.

Wholesalers must apply for an exemption certificate from the Internal Revenue Department, swearing they will pay the federal tax at time of sale.

When the exemption is granted, they are required to make performance bond of not less than $2,000 with a possible ceiling of $30,000. The revenue department may require higher bonds in specific cases.

Wholesalers choosing to pay the tax direct will make a quarterly return to the revenue department, with details of their transactions. This will swing the burden of gasoline-tax bookkeeping from the refiner to the individual jobber.

No rules yet . . . Rules are not yet hard and fast.

They will be given a thorough going over at a public hearing December 1 at the internal revenue office in Washington. Formal regulations will be issued after this conference.

Manufacturers will continue to pay the federal tax, in every case, until the wholesalers who elect to pay the tax make bond and file their exemption certificate numbers with suppliers.

This shift in tax responsibility may be accomplished at any time after January 1. If a jobber changes his mind, after once determining he will pay the tax, he can swing the responsibility back to the refiner by applying to the revenue office at any time.

Some reservations . . . The law is viewed by some jobbers as a long overdue moral victory.

However, there still is a wide difference of opinion among wholesalers on the wisdom of rushing into the tax exemption option without a thorough study of each individual operation.

One major jobber, in a two-state area, says he will save about $1,800 a year in handling gasoline tax matters through his 36 outlets.

Another, doing a much larger volume of business, likes the idea of letting Uncle Sam wait for the tax, but he feels his personal savings will not much more than match the cost of additional record-keeping and nominal costs of performance bonds.

Paper work . . . The proposed regulations require a wholesaler making application for tax-paying exemption to:

... **Describe** his storage equipment and facilities, in detail.

... **File a statement** showing the percentage which his bulk sales of gasoline is expected to bear to his total sales of lubricating oil.

... **Make estimates** of anticipated business so the amount of bond can be approximated to cover the expected tax liability for a 3-month period.

There will be much other paper work. One job, developing when a wholesaler decides to file for tax exemption, will be immediate preparation of a report showing how much tax-paid gasoline he has in storage.

The government may either give him credit for this, or it may ask him to pay tax on total gallonage sold after an exemption certificate has been issued and then file for a refund.

One puzzler is the effect of "temperature control" or "evaporation credit" sales by some refiners.

If a company has granted a wholesaler a 2% or higher credit for evaporation losses—and if the evaporation losses have been less than this amount—a jobber might choose to continue to pay the federal tax to his supplying company as he now is doing.

Oil companies have advised distributors of the proposed regulations and the optional provisions. They also have informed them the new procedure applies only to the gasoline tax and does not affect the present handling of the 6-cent a gallon tax on lubricating oil.

Jobber organizations in 39 states are huddling now over how best to take advantage of the new relaxed federal tax-paying privileges.

PROCESSING BRIEFS . . .

A 50,000,000 lb. per year industrial-alcohols plant is planned by Continental Oil at Lake Charles, La. With completion of the plant in 1961, some of the higher alcohols will be available commercially for the first time from petroleum. The process will use a new technique where chain growth of ethylene is promoted by organo-metallic catalysts, followed by oxidation and hydrolysis to primary straight-chain alcohols containing an even number of carbon atoms. Lummus Co. is the engineering and construction contractor.

A new company, Phillips-Joanna Co., has been formed by Phillips Petroleum Co. and Joanna Western Mills Co. of Chicago to make linear polyethylene-type film for high-speed packaging as well as conventional film. It will headquarter in Chicago. Joanna Western Mills has been in the plastics field since the 1920's and is a large manufacturer of window shades. A new processing plant for making film is being completed at Ladd, Ill.

Amarillo Oil Co. plans to start construction in December of a gasoline plant 12 miles south of Pampa in Gray County, Texas Panhandle. The plant will be built on the site of a compressor station recently completed by Pioneer Natural Gas Co., parent firm of Amarillo Oil. The plant will

CONSTRUCTION moves ahead on Texas' big King Ranch gas-processing and cycling plant, largest in U. S.

King Ranch Gas Plant in Partial Operation

HUMBLE Oil & Refining Co. has begun cycling operations from newly completed portions of its giant King Ranch gas plant, 14 miles southwest of Kingsville.

Concrete foundations are in place and the contractor, Hudson Engineering Corp., Houston, is installing processing equipment.

This gas-processing and cycling plant, largest of its type in America, is scheduled for completion in mid-1960. It will recover 28,000 bbl. of liquid products daily from 800 million cubic feet of gas.

Until construction is completed, liquids will be recovered from produced gas by normal separation. Separator gas is then reinjected into producing reservoirs by seven 2,000-hp. compressors.

The company estimates the program will increase recovery of hydrocarbons from the cycled reservoirs by roughly 23 million barrels (OGJ, Sept. 15, 1958, p. 14).

King Ranch plant is part of a $75-million program to develop Humble's gas reserves in nine southwest Texas counties. Also a part of the program is a newly completed 238-mile 30-in. gas pipeline which takes gas from King Ranch to the Houston industrial area. Operations on this line started in early October.

Gas supplies for the new 30-in. line are coming from a number of southwest Texas fields through an extensive gathering system. Until the gas plant is completed, the line is drawing gas directly from the fields. After completion of the plant, residue gas will be used for cycling and pressure maintenance and to supply the 30-in. line (OGJ, Oct. 12, p. 95).

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have a design capacity of 45,000,000 cu. ft. of gas daily. Liquids production at that rate would run about 52,000 gal. a day. Propane will be trucked and the butane and natural gasoline piped to markets.

A new laboratory for petrochemical customer service will be built by Continental Oil Co., at Englewood, N. J., Conoco will move most of its present customer-service activities at Chestertown, Md., and Ponca City, Okla., to the new site. The New Jersey site was chosen because the export business is expanding rapidly and it will be convenient to visiting foreign customers. J. C. Stanberry, Jr., formerly of Ponca City, will be director of the new laboratory. Harold McDonald, research chemist at Chestertown, has been transferred to Englewood to become research group leader at the laboratory.

Stauffer Chemical Co. will erect a carbon disulfide plant at Delaware City, Del., on land purchased from Tidewater Oil Co. The new plant, due for completion in November 1960, will use sulfur from the Tidewater refinery and methane from Eastern Shore Natural Gas Co.

Also for Refiners . . .

IN THE NEWS: Texas Railroad Commission puzzled by inconsistency in product-stock reports (p. 40) . . . California independents organize to fight for lower quotas on imports (p. 42) . . . Sun plans to expand its six-grade marketing after finding that custom blending helps sell more gasoline (p. 44) . . . New rules governing who pays the new federal gasoline tax come up for hearing in December (p. 48) . . . New imports quotas due soon (p. 50) . . . Cuban Government raises the threat of close control over refining and oil exploration (p. 57) . . . New type distillation plant may overcome fresh-water shortages in many remote oil areas (p. 57).

PLUS THESE TECHNICAL REPORTS: Pincher Creek gas is a sweetening problem (p. 67) . . . New automatic flash tester (p. 70) . . . Waste-water aeration: Key to efficient removal of impurities (p. 78).

New Import Quotas

. . . may be announced by end of week. No major changes are expected, but West Coast quotas will be revised to cut amount of foreign oil coming into District 5.

OIL-IMPORT control plans for the first half of 1960 will be announced shortly, perhaps by the end of this week.

No major changes are expected, either in regulations or in total quotas. However, there will be some adjustments.

The biggest planned change calls for a substantial increase in residual-fuel import quotas for Districts 1-4. This may amount to a hike of as much as 100,000 bbl. daily over current-import levels, and more later if necessary.

Factors involved . . . There are three principal factors involved in this planned increase.

Government officials want to be sure there will be no residual-fuel shortages or strong pressures for price hikes. Earlier, they had feared that the current quotas might prove too low, but the steel strike and its resulting drop in residual-fuel demand apparently reduced the danger of any shortage before the year's end.

Too, it is understood that Bureau of Mines' forecast for next year includes increased residual-fuel demand.

Finally, the continuing decline in the percentage of residual fuel refined by domestic refineries further widens the gap between domestic supply and domestic demand.

Aside from increased residual quotas, the other principal changes will affect District 5 and the status of newcomers to the product-import picture.

West Coast changes . . . The net effect of the planned change for District 5 will be to reduce slightly the quotas for imports or crude from countries other than Canada.

This will result because more Canadian crude will be included in domestic supply figures, leaving less to be imported from other countries to fill the gap between domestic supply and domestic demand.

Originally, when the President exempted from imports controls crude moved into the Puget Sound area by pipeline, he specified that 23,000 bbl. daily of this crude would be included in District 5 domestic supply figures.

As it turned out, the 23,000 bbl. daily figure was about 32,000 bbl. daily too low since about 55,000 bbl. daily was being pipelined into the Pacific Northwest from Canada.

This meant that 32,000 bbl. daily was coming into District 5 that was not being accounted for either in import quotas or in domestic supply figures. As a result, there was some oversupply.

To correct this, the plan now is to include all of the exempt Canadian crude in the domestic supply figures.

The Journal last week incorrectly stated that the result of this change would be to increase the amount of imported Canadian crude. Actually, it won't change the amount, but will only change the bookkeeping procedure. This will affect imports into District 5 from other countries but not the imports by pipeline from Canada.

Newcomers . . . The change in the works affecting newcomers to the product imports picture is this:

A presidential proclamation will broaden the authority of the Oil Imports Appeals Board to give it more leeway in considering applications for product import quotas for newcomers. (Up to now, product quotas have been limited to those who had imported products before the controls program was established).

If the planned proclamation is issued, the OIAB will start considering individual requests from newcomers for product import quotas.

However, such requests, if granted, will not go into effect until the allocation period beginning July 1, 1960.

Government officials had originally considered making some room for newcomers in the upcoming allocation period, beginning January 1. However, they abandoned this plan because it would require the establishment of a "kitty" to take care of anticipated increases—and there was no way of knowing in advance what size "kitty" would be necessary. Furthermore, some newcomers would enter the program ahead of others.

Therefore, by setting July 1 as the starting point for any newcomer quotas, all newcomers would get an even start and the Government would be able to adjust total second-half quotas to make room for the newcomers.

All of the proposed changes have been approved by the Interior Department and are now at the White House for approval.

White House action is expected be-

watching WASHINGTON

Clyde La Motte

• Depletion foes harp on "subsidy" . . .

OPPONENTS OF PERCENTAGE depletion apparently intend to put increasing emphasis on the "subsidy" angle.

Their argument is that percentage depletion is, in effect, a form of subsidy. If a subsidy is needed, they maintain, it should be handled as such, and should not be in the form of a tax provision.

The subsidy approach is the more desirable, they say, because it would be subject to annual review and change by Congress, so that it could be adjusted to changing conditions. By contrast, percentage depletion remains the same through war and peace, depression and boom, surplus and scarcity.

This line of argument was evident in several of the papers on percentage depletion presented to the House ways and means committee. And it was touched by Rep. Wilbur Mills (D.-Ark.), chairman of the House ways and means committee, in a recent tax article in Life magazine.

Discussing percentage depletion and fast tax writeoffs,

fore the President leaves at the end of this week for his world tour.

October figures . . . Imports of crude and unfinished oil, finished products, and residual fuel totaled 1,365,482 bbl. daily in October, Interior announced last week. In September, the total was 1,397,598 bbl. per day.

Imports of crude and unfinished oil into Districts 1-4 averaged 680,435 bbl. daily in October. In September, the figure was 728,203 bbl. per day. Other totals for Districts 1-4 in October were: Finished products, 59,612 bbl. per day; residual fuel, 304,106 bbl. per day, and exempt crude imports from Canada, 47,834 bbl. per day.

In District 5, crude and unfinished oil imports in October were 230,611 bbl. per day, compared with 198,947 bbl. per day in September. Other October totals: Finished products, 3,223 bbl. per day, and exempt imports from Canada, 39,396 bbl. per day of crude and unfinished oil.

An importer may bring in any portion of his 6-month allocation at any time during that 6 months.

Aneth Spacing Ruling Delayed Until Next Year

• Utah commission will reconvene in January, then rule on controversial 40-80-acre issue within 30 days.

OPERATORS in Utah's Greater Aneth field will have to wait until next year to find out if the present 80-acre spaciing rule is to be continued or replaced with 40-acre spacing.

After hearing testimony for 2 weeks on the 40-80-acre spacing controversy which started in the fall of 1957, the Utah Oil and Gas Conservation Commission last week recessed the Salt Lake City hearing until early January. It then will rule within 30 days after the hearing closes.

The large number of exhibits—almost 200—prevented concluding the hearing before Thanksgiving. Since the drilling of some 400 wells is at stake, lawyers for both sides extensively cross-questioned most witnesses.

The commission last year said it intends to order 40-acre spacing unless proponents of wide spacing can prove that one well will effectively and efficiently drain 80 acres.

Carter Oil Co., Texaco Inc., Continental Oil Co., Phillips Petroleum Co., and Superior Oil Co., presented testimony to support 80-acre drainage (OGJ, Nov. 16, p. 135, Nov. 23, p. 52).

Shell Oil Co. claims 40-acre spacing is needed efficiently to drain Aneth's complex pays. Vertical and horizontal communication between porous zones is not sufficiently developed, Shell claims, to assure that some oil won't be missed by 80-acre spaced wells.

Most of the Shell testimony dealt with five 40-acre wells it drilled earlier this year to prove its point. Infilled on 80-acre tracts in the Aneth and Ratherford areas, the test wells sought islands of porosity which were not being drained by existing producers.

Some such zones were found, according to the logs, core analyses, and pressure data brought out in Shell exhibits. For the most part, however, any virgin zones tapped by the test wells were either extremely tight or had high-water saturation.

Mills said: "It might help to think about them as the equivalent of a subsidy paid to business. . . ."

"This particular subsidy never gets examined in any appropriations committee hearings at budget time. When we think the budget is tight, we may look around for places to cut expenditures by slowing down the missile program or by slowing down highway construction, but since the subsidies are hidden in the tax law, they escape notice."

He concluded: "A careful examination is long overdue."

Mills, who may have been using the article as a fishing expedition, also dangled some tax cut bait before his readers. He said the corporation tax rate could be lowered from its present 52% to 44%—with the Government getting the same amount of revenue—"if all real earnings of corporations were taxed—not just those that currently qualify as earnings for tax purposes." In other words, if percentage depletion and fast tax writeoffs were abolished.

Just how much of a push this approach will get may become more evident this week as the ways and means committee hears a panel discussion on percentage depletion. The basic positions of the panel members has already been established by the views they presented in their written papers. Therefore, most attention will be on the questioning of the panel members by the committee.

• Atomic shale test faces delay . . .

THE BUREAU OF MINES is holding up plans to negotiate with oil companies on a proposed project to fire an atomic bomb in an oil-shale formation. The reason: The uncertainty over whether the U. S. will continue its ban on nuclear explosions, and for how long.

• Interior readies its oil cost study . . .

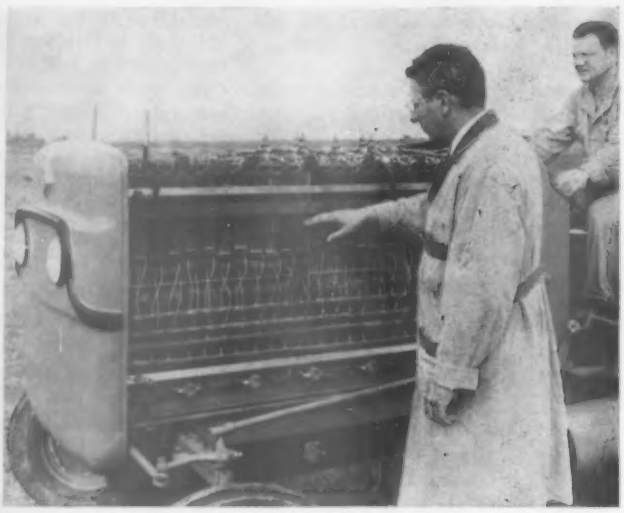
A QUESTIONNAIRE to determine the costs of oil exploration and drilling may be approved soon by the Bureau of the Budget. If so, it will be mailed out early next year.

The questionnaire planned by the Bureau of Mines will cover such items as annual payroll, total cost of supplies used, cost of purchased machinery installed, capitalized expenditures (except for land and mineral rights), gross cost of drilling and equipping wells, net company interest in cash outlays whether expensed or capitalized, and net company operating revenue.

Companies will be asked to supply the information on a state-by-state basis, thereby enabling the Bureau of Mines to note the differences in costs by regions.

Originally, the questionnaire called for a breakdown between oil and gas costs, but there were some industry objections that this might be used by the Federal Power Commission in natural-gas rate cases. As a result of the objections, the oil-gas breakdown probably will not be requested.

Bureau of Mines officials, hoping to get a high rate of return on the questionnaires, have kept the form short (one page). Furthermore, they will use field people to encourage companies to return the questionnaires and will lend a hand to anyone having any trouble in filling out the form.



FUEL-CELL TRACTOR, powered by 1,008 fuel cells, was developed by Allis-Chalmers. It uses propane and oxygen to produce electricity, which drives a 20-hp. motor.

MHD POWER PLANT uses a heated and ionized gas, flowing through a magnetic field, to produce electricity, which is tapped off directly from the gas through electrodes.

Direct Fuel-to-Electricity Units Come Closer

• Avco announces it is making electricity by using hot gas as a generator armature, and Allis-Chalmers discloses it is running a tractor with fuel cells.

TWO NEW PROCESSES for converting fuel to electrical energy have moved a step closer to commercial application.

. . . **Magnetohydrodynamics** has been used in an experimental device to generate an electrical output of more than 11,000 watts.

. . . **Fuel cells** have been successfully adapted to power a vehicle for the first time.

Ten utility companies have joined Avco Corp. in the development of an MHD process for the generation of electric power. The group plans to spend $350,000 in the next year to further the development of this process. The utilities will ante up $230,000 and Avco, $120,000.

The generator . . . Research will be carried on at the Avco-Everett research laboratory at Everett, Mass.

A small, experimental laboratory device, using the MHD principle to generate more than an 11,000-watt output, is operating successfully.

Key to the success of the MHD process is the substitution of a "hot" gas for the armature in a generator. gas is heated to temperatures of 3,000-5,000° F. Ionization takes place at these temperatures and the gas becomes a conductor. When passed through a magnetic field, it will generate electricity.

Oil, coal and atomic energy are under consideration as the heat source.

Coal is the first choice at the moment. It is added to preheated air and burned to obtain the very high furnace temperatures. Furnace gases, seeded with potassium to increase conductivity, pass through the MHD generator where the heat energy is converted into electrical power.

If atomic energy is used, an inert gas, argon or helium with 1% cesium seeding, would serve as the working fluid. Its better conductivity would permit use of lower temperatures. It would also avoid any corrosion from products of coal combustion.

Avco and the utilities have very good reason for backing research in magnetohydrodynamics:

Thermal efficiency of 55% could be obtained. This compares with a maximum of 40% for the armature and the turbine needed to drive it.

The tractor . . . Fossil fuels don't appear too attractive for use in an MHD process, but one, propane, has been used in the first application of fuel cells to the propulsion of a vehicle.

Mixed gases, largely propane, are used as fuel for the cells which power a tractor developed by Allis-Chalmers Manufacturing Co.

While of commercial size and capable of developing 3,000 lb. of drawbar pull, the tractor is still a "research vehicle."

Electric power which drives the tractor comes from 1,008 individual fuel cells, arranged in 112 units of nine cells each. The units are arranged in four banks, and electricity can be taken from any combination of banks.

Gases are fed into the cells through a system of tubing and there react in an electrolyte. A catalyst coating the electrodes of each cell speeds the reaction. This reaction in the cells causes a direct current to flow through an external circuit connected by busbar to a standard controller. The controller regulates power to a standard 20-hp. motor.

Allis-Chalmers had a team of 20 scientists working on its adaptation of the fuel cell. This research is stimulated by the fact that, theoretically, there is no limitation on efficiency.

Its goal is to produce electric power from a fuel at an efficiency of possibly 90%. This would compare with an efficiency of 40% from the best diesel engines.

Examiner Approves El Paso-Pacific Merger

• Big questions now involve outcome of December 10 review by FPC and whether the Justice Department will press its suit to halt the merger.

A FEDERAL Power Commission examiner has approved a proposed merger of Pacific Northwest Pipeline Corp. and El Paso Natural Gas Co.

The examiner's ruling was in direct contrast to a suit filed by the Justice Department in 1957 to block the merger on antitrust grounds.

That suit is still pending, having been held up in a U. S. District Court in Utah to await FPC action. Whether the Justice Department will continue to press its suit remains to be seen, but it may do so in an effort to clarify whether monopolies authorized and supervised by the Government are subject to antimonopoly action.

The examiner, in making his ruling, was fully aware of the conflict it would have with the Justice Department's move. He made it clear that, in his opinion, the Justice Department is off limits.

Examiner's reasoning . . . He cited a 1950 amendment to the Clayton Act which, he said, makes the act's prohibitions inapplicable to transactions approved by the FPC.

He said the power of the commission to regulate and supervise natural-gas companies "constitutes a protective shield against the evils of monopoly."

The examiner also defended the merger on its own merits, using this line of argument:

The proposed merger would not substantially lessen competition either for markets or for supplies because there had been little competition in these areas by the two companies.

The examiner said there had been some potential market competition between the two in California, but that Pacific Northwest had not had the financial capacity to compete there seriously.

Anyway, he said, El Paso still faces keen competition for California markets even though it merges with Pacific Northwest because another pipeline company (Transwestern) already has been authorized to serve California and another (Pacific Gas & Electric) has made application to do so with Canadian gas.

Therefore, he concluded, "The public interest will not be hurt by the elimination of Pacific Northwest as a competitor for natural-gas sales in California or elsewhere."

As for competition for supplies, the examiner reasoned, there will be sharp competition from other companies in the areas where El Paso is a purchaser even though competition from Pacific Northwest will be eliminated.

The examiner's decision is subject to review by the commission, which has set a hearing for December 10.

What's involved . . . The merger would link two major gas pipeline systems.

El Paso operates a system in the southwestern U. S., selling to customers that serve markets in Arizona, California, Nevada, New Mexico, and Texas.

Pacific's system extends from the San Juan basin in New Mexico through Colorado, Utah, Wyoming, Idaho, Oregon, and Washington to the U. S.-Canadian border.

The company serves customers in all of those states and obtains its gas supplies both from U. S. and Canadian sources, including the Rocky Mountain area.

El Paso acquired 99.8% of Pacific's stock in 1957 through a stock-exchange deal.

Under the merger plan, El Paso will acquire the remaining shares of Pacific's stock, including all preferred stock. Then all of Pacific's stock will be canceled along with all indebtedness between the companies.

PIPELINE BRIEFS . . .

Bids will be received around the middle of December on a 117-mile 34-in. line from Needles to Newberry, Calif., for Pacific Lighting Gas Supply Co. The line will connect with the 30-in. Transwestern Pipe Line Co. system which is now under construction and will be completed by June 1, 1960.

A 20-mile 26 and 20-in. loop is planned by Atlantic Seaboard Corp., a subsidiary of Columbia Gas System, Inc. Atlantic has asked the FPC for authority to install the loop at a cost of $1,946,300.

A $31,188,000 construction program to increase capacity by 100,000 M.c.f. daily to 830,000 M.c.f. daily is planned next year by Natural Gas Pipeline Co. of America. Natural has asked the FPC for permission to build 151 miles of 36-in. loops between Ford County, Kansas, and Joliet, Ill., and a new 180-mile 24-in. line from Kiowa County, Oklahoma, to its main line near Minneola, Kans. The new line will give Natural access to large proved and potential gas reserves in southwestern Oklahoma. Last year the company spent $63,000,000, principally for 490 miles of 36-in. loops and compressor facilities.

Gulf Gas Co., a new firm headed by Al Jergins, San Antonio independent operator, has started construction of a 40-mile gas line from Brown County, Texas, to Ranger in Eastland County. The 4 and 6-in. system will take gas from Brown County wells which have been shut in for more than 2 years. The gas will be processed at a plant owned by Graridge Corp. 2 miles south of Eastland, Tex., then piped on to Ranger and sold to Featherlite Corp., of Austin, to fuel its light aggregate kiln there. The new line is expected to be in operation shortly after the first of the year.

Also for Pipeliners . . .

IN THE NEWS: New lightweight engine with only two moving parts promises high efficiency and fuel economy. Curtiss Wright will start production in 1960 of models ranging from 100 to 700 hp. (p. 43) . . . Humble begins cycling operations from newly completed King Ranch gas plant, largest in U. S. (p. 49) . . . FPC examiner approves merger of El Paso Natural and Pacific Northwest (p. 53).

Pipeline construction report will be found on p. 94.

PLUS THIS TECHNICAL REPORT: Procedure for adequate testing of multiphase-flow pipelines (p. 60).

Wider Spacing Urged

. . . in some parts of report by West Central Texas association. Group wants Rule 37 left alone, but says temporary allowable immediately after discovery is needed.

THE WEST CENTRAL TEXAS Oil and Gas Association came out strongly November 19 for a change in Texas regulations to provide for temporary spacing rules for new fields immediately following completion of their discovery wells.

The temporary-spacing proposal was part of a report by the association's well-spacing committee. The report was presented and adopted at the association's twenty-sixth annual convention in Abilene.

The proposal suggests that:

An operator include a proposal for temporary spacing rules with his application for a discovery allowable. He would be required to give positive notice to all offset operators within a reasonable radius of the discovery. And such operators would have 10 days in which to object to the application.

The Railroad Commission would be empowered to grant the application if no objection were filed and if the spacing appeared proper. If an objection should be filed, it would set a hearing to take evidence and arbitrate the application.

Such a system, the report said, would largely eliminate the cluster of wells which at present frequently occurs around a common corner and breeds spacing on too close a pattern.

Under present rules, the report held, operators are inclined—and, in effect, encouraged—to crowd as close to a discovery well as possible to insure finding production. This results in a situation in which operators trap themselves into spacing too close before rules for a new field are set.

Under present regulations, a hearing to establish spacing and other field rules is held after the sixth well is completed in a new reservoir or after 18 months, whichever occurs soonest.

Rule 37 abused . . . The well-spacing report, the result of what is believed the first such study to be made by an association of oil and gas operators, made these further findings:

. . . **Present basic spacing** providing for 20-acre spacing in Texas need not be changed because no state-wide minimum spacing rule for either oil or gas would fit all fields. And present Texas rules do not prohibit wide spacing of wells.

. . . **No change in Rule 37** should be made. The report pointed out the right of the individual to recover the recoverable hydrocarbons underlying his land has been widely accepted for many years.

However, permitting the small-tract owner to recover a disproportionately large share of a field's reserves "amounts to confiscation of property just as surely as though that operator had been denied the opportunity to recover any of the reserves."

"It is our opinion that such inequities can be corrected by giving more weight to the acreage factor than to the well factor in the allocation formula."

. . . **Voluntary unitization** makes it possible for such a small-tract owner to recover his fair share of reserves without having to drill an unnecessary well.

. . . **Close spacing** of wells does not result in any less recovery of oil or gas from a reservoir but may result in economic waste due to unnecessary expenditures for drilling wells.

. . . **Texas' 1947 yardstick** gives little weight to acreage. There is no yardstick allowable as such for wells on spacing of more than 40 acres. But present practice is to allow one additional barrel over the 40-acre yardstick for each acre above the 40.

. . . **Doubling the density** of drilling at depths below 2,000 ft. essentially doubles the lease and field allowable under the 1947 yardstick. Under the so-called "county regular" rule, no weight whatever is given to increased acreage; hence, doubling density doubles allowable.

. . . **Each field** should be a separate case when considering optimum spacing of wells and allocation of oil and gas production. This is so because reservoirs differ from each other as to areal extent, thickness, depth, reservoir rock and fluid characteristics, and mechanics of production.

. . . **Allocation formulas** based 100% on acreage would not provide for withdrawal in proportion to the reserves underlying the various tracts in a field due to the differences in thickness and quality of a productive formation.

. . . **Industry cannot rely** solely on government regulation to enforce practices which are obviously essential to the best economic welfare of the operators.

Report commended . . . The committee's report was lauded by Eugene T. Adair, vice president of Texas Pacific Coal & Oil Co., Fort Worth, as the "finest on the subject I have heard."

Chairman of the well-spacing committee which made the study was James E. Russell, Abilene. Serving with him on the committee were: Richard R. Bloomer, George A. Hughes, Jr., F. A. Hunter, and Earl Jones, all of Abilene, and E. A. Karper and E. Bruce Street of Graham, Tex.

FPC to Speed Up Handling of Cases

THE FEDERAL Power Commission, desperately seeking ways to speed up natural-gas cases, last week made some changes in its rules and regulations.

Basically, the changes involve the use of conference procedures both before and during hearings. The hope is that these conferences can eliminate non-controversial items from the agendas and records of the formal hearings.

If this can be done, they reason, it will help shorten the hearings and shorten the records which both the case examiner and the commission, itself, now have to wade through before deciding a case.

The net result, the FPC hopes, will be a shorter lapse between the time a case is initiated and the time a decision is issued.

The speedup in tempo would enable the commission to whittle into the vast backlog of natural-gas cases now before it.

Specifically, the new procedure provides for advance discussion of the best way to examine a given case; separation of the controversial issues from the noncontroversial; stipulations on the undisputed legal and factual matters; and efforts to provide only limited treatment of issues which do not have an important bearing on the case.

In making the announcement, the FPC noted that there has been criticism of the slowness with which regulatory agencies handle proceedings before them.

It said the changes were first suggested by the Federal Power Bar Association, an organization of attorneys who practice before the FPC.

Independent Still Plays Major Oil Role

. . . in the U. S. industry, Rodman tells West Central Texas association. Gloomists also wrong about future of oil.

THOSE who preach doom and gloom about the U. S. running out of oil are all wet.

And those who say the independent oil man is disappearing as a major factor in the industry are just as wrong.

These, at least, are the sentiments of Roland V. Rodman, president of Anderson - Prichard Oil Corp., as expressed before the twenty-sixth annual meeting of the West Central Texas Oil and Gas Association.

The gloomists have always been wrong before. And the present crop will be embarrassed as were their predecessors in the past, Rodman said.

Present oil reserves can be expanded he said, any time producers see the need. "Every time we get an opportunity to sell a barrel of oil, we will find a barrel and a half."

If producers are to continue doing their job, however, they must have certain incentives. "The import plan must be continued. Gas must be freed from controls. And the depletion allowance must be kept."

Gas underpriced . . . The producers must get more money for their gas, Rodman said. And the only way they can do this is to wipe out government controls.

"Gas now is selling so cheap that we're losing money on it.

"We are selling our oil at an average price of $3.01. In contrast, we now are selling our gas—in a volume with the energy equivalent of a barrel of oil—for only 61 cents. This must be corrected.

"Even our oil is far underpriced", Rodman said, "in comparison with other commodities. If oil prices had risen only 2% a year, the price of oil would today be $3.50 a barrel. And this would still be far behind the price gains made by steel and other industries."

Prime responsibility for this can be charged to failure of major oil firms to handle excess refining capacity intelligently. Rodman said this was particularly evident this year. The majors, for 1959, foresaw a gain in demand for oil products of about 5% in the U. S. "But supply was whooped up 10%."

The large companies must take this problem in hand or it will never be whipped. The big companies, Rodman said, have an overwhelming proportion of total domestic refining capacity—about 87%. Only they can do the job.

Independent to stick . . . The independent oil man, Rodman predicted, will be around a long time and will continue to play a major role in the industry.

Even in the dismal year 1958, plagued by oversupply and pared prices, he held his own. Drilling figures provide ample proof. The independents drilled slightly more than 76% of all wells drilled in the U. S. in 1956 and again in 1957. They even managed to increase this proportion slightly in 1958 to 77%.

New officers . . . Members of the West Central Texas association elected Sam Robertson, Abilene, as president for 1960.

He replaces Jim Lauderdale, also of Abilene.

Serving with Robertson as other new officers will be: W. G. Arnot, Jr., Breckinridge; Hill Tindell, Mayfair Minerals, Abilene; W. W. Wilson, Abilene; and James E. Russell, Abilene, all vice presidents; and Bailey Lewis, Abilene independent, treasurer.

Amoco Strikers Sue OCAW, 18 Resume Work

NEW TENSIONS invaded the 5-month-old strike at the American Oil Co. refinery in Texas City last week when 18 striking employes crossed the picket line to return to work.

The small-scale back-to-work movement was preceded by a $375,000 damage lawsuit against the Oil, Chemical & Atomic Workers Union by 17 refinery workers who charged they had been prevented from returning to work because of threats and intimidation.

After the returning workers passed the picket line without incident, the refinery management drafted a letter to all the 1,250 strikers inviting them back to work and explaining they could return under Texas law. The company said in the letter "there is no prospect of settlement" of the long strike.

Union may sue . . . Numerous negotiation sessions have broken down on the issue of work assignment.

The company claims the union seeks to take over management's authority to assign jobs. The union claims the company seeks to require workers to do jobs outside their classifications. Wages are not an issue.

The company said it had offered new concessions in regard to holiday pay, funeral benefits, and severance pay but that "the union leaders stick to their demands that would give them a veto power over job assignments."

Among the 18 who crossed the picket line were 13 workers who had joined with four others in filing suit to collect $75,000 actual damages and $300,000 exemplary damages from the union. They charged that union pickets had "unlawfully and maliciously" prevented them from working.

The union threatened to retaliate with lawsuits of its own against the plaintiffs.

The Texas City refinery has been operated by supervisory personnel and has been processing about 100,000 bbl. of crude daily.

Baton Rouge voting . . . The top labor news in the oil industry this week will probably center at the Esso refinery in Baton Rouge.

Some 3,300 production and maintenance workers at the plant vote December 2 and 3 for a bargaining agent as the climax of 18 months of labor strife.

Four unions are competing in the election, which is sponsored by the National Labor Relations Board. A runoff will be held if one of them fails to gain a majority.

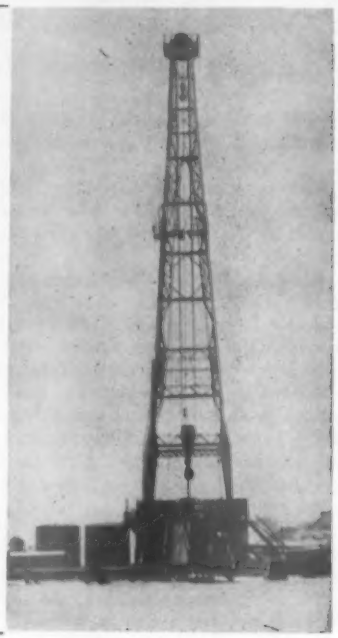
Competing to represent the Esso workers are an independent union, the Independent Industrial Workers Association, which formerly represented the workers; the Baton Rouge Metal Trades Council; and two international unions, OCAW and Jimmy Hoffa's Teamsters International.

All four unions have been campaigning vigorously. Several top men have been imported to speak to the workers, including O. A. (Jack) Knight, OCAW's president, and Hoffa.

A rundown on Libyan oil wells

COMPANY	BLOCK	WELL	DEPTH (FT.)	CAPACITY (B/D)	°API
Oasis	32	Bahi A-1	6,100	800	40
Oasis	32	Dahra B-1	4,940	800	46
Oasis	32	F-1-32	4,600	800	
Oasis	32	B-3-32	4,567	400	
Oasis	26	A-1-26	5,700	Substantial show —still drilling	
Shell	70	Bir-Tlacsin	8,976	700	44
Gulf	66	Em-Gayet	4,100	750	35
Libyan-American	17	Mabruk	5,700	1,200	40
Libyan-American	17	Zahalin	9,228	900	39
Esso-Libya	6	Zelten 1	5,670	17,500	37
Esso-Libya	6	Zelten 2	5,850	15,000	37
Esso-Libya		Zelten 3	7,657		
Amoseas	47	Beda B-1	5,107	3,650	36
Mobil Oil	12	El-Amal B-1	11,290	865	35

Other "substantial shows" include Esso's Atshan 1 and CPTL's Oued-Tahara (Block 49). Amoseas is now testing Beda 2 for production. Zelten 4 is drilling.



Libya's Zelten Field Scores Again

• This time it's a new prolific pay, about 2,000 ft. below the zone of the first two Zelten wells which tested 17,500 and 15,000 bbl. daily.

A STEPOUT in Zelten field has found a new prolific pay below the zone that earlier this year electrified the oil industry and almost overnight turned Libya into the world's hottest exploration country.

Zelten 3 yielded 100 bbl. an hour of fluid on a 22-hour drill-stem test of a 45-ft. limestone section topped at 7,615 ft. The fluid was 68% oil and 32% emulsion.

The new well is a sleeper for Libya and was generally being written off as a dry hole by observers. It was dry in the Paleocene pay which tested 17,500 bbl. daily in the new discovery and 15,000 bbl. daily in No. 2.

After the disappointing tests of the upper pay, Esso Libya deepened the hole, drilling through shale sections and finally shale and chalky limestones to 7,610 ft. When the new crystalline limestone was topped at 7,615 ft., casing was set at that point and the drill-stem tests made.

No cores have yet been taken but Esso geologists are assuming it is cretaceous. Esso plans to carry the hole to basement or quartzite.

Zelten 3 is 5.4 miles southeast of Zelten 1. No. 2 is about 4½ miles southwest of the discovery. The wells are in the 26,690-km. (about 9,919 sq. miles) Block 6, and about 100 miles south of the Mediterranean coast and 200 miles south of Benghazi.

Zelten 2 tested 15,000 bbl. daily from a 145-ft. section of Paleocene limestone from 5,770-5,915 ft. (OGJ, Aug. 24, p. 64). The discovery itself tested 17,500 bbl. daily from a 205-ft. section of the same limestone from 5,460-5,665 ft.

Italians get concession . . . The Zelten find spurred a rush for open acreage in eastern Libya, and a concession has now been awarded to the Italian state company, ENI.

The Libyan Government in the face of stiff opposition from violent anti-Italian attacks in the local press have granted Block 146 to ENI affiliate, Cia. de Ricerche del Idrocarburanti.

The concession covers 29,997 sq. km. (about 11,570 sq. miles). It straddles the twenty-ninth parallel along the Egyptian frontier. Oasis Oil's Block 33 lies to the north, and British Petroleum's Block 80 to the south.

Terms of the agreement with the Italians have not been learned. But ENI head Enrico Mattei reportedly is in the process of setting up a joint Libyan-Italian marketing company, which would market local production. It was Mattei who 2 years ago negotiated a precedent-shattering agreement with Iran that will in effect give Iran the benefit of a 75-25 profit split if commercial production is developed.

Discovery list grows . . . The list of Libyan discoveries is growing with a regularity that is becoming almost monotonous.

The latest find in western Libya, drilled by Oasis on Concession 26, reportedly promises to be the best well in that half of the country. But the operator will make no announcement until the well is completed.

Only 61 wells have been drilled in the African country, which is 2½ times as big as Texas. But of these wells, 14 came in as oil producers and 2 as gas wells. The remaining 46

"dry holes" include at least 1 noncommercial well in the 300-bbl.-daily class.

There are now 25 rigs in the country, and 19 of them are on wildcats. There are 28 seismic crews and 1 gravity crew in the field.

Discoveries in western Libya have been coming in at 300 to 700 bbl. daily. Finds in eastern Libya have been bigger. The most important is Esso's 17,500-bbl. Zelten 1. Because of wide differences in findings in the two parts of the country, geologists now consider Libya as having two separate geological provinces. The western is Paleozoic, and the eastern, Tertiary.

Drilling problems are average, with the exception that lost circulation can be a major problem. This is because water is extremely scarce in some parts of Libya, and shutdown time for lack of water can be very costly.

Two water wells needed for a wildcat frequently can cost $20,000 to $25,000. Sometimes the cost of water wells plus transportation, for a single well can run as high as $100,000.

The latest compilation of oil-well data (see table) obtained in Libya for the Journal from companies and the Petroleum Commission shows that completions so far test a total of 43,365 bbl. daily. The oil has been ranging from 35° to 46° API.

Cuban Oil Under Nationalization Threat

• Government control of refining industry is feared under new oil law. One small plant already has been seized.

THE SPECTRE of nationalization hung over the Cuban oil industry last week as the result of a puzzling move by the Castro government.

The government has approved a new law that sharply limits exploration and opens the door for possible nationalization of the refining industry.

A Petroleum Reform Institute has been set up with authority to carry on exploration, refining, transportation, distribution, sale, and purchase of oil products. The institute has been given the power to operate any oil company or refinery that may be seized by the government. It also has authority to regulate the local refining industry and domestic marketing.

The new law limits concessions to 20,000 acres for each company or individual. It also limits the life of the holdings to 2 years.

Ironically, companies have spent $30 million over the past 12 years in an exploration play that has netted virtually nothing.

A 60% royalty has been imposed on crude production. But total output for the entire country amounts to less than 600 bbl. daily.

Big threat . . . The threat to refineries is potentially more serious.

Plants owned by Jersey Standard, Royal Dutch-Shell, and Texaco have a combined capacity of 84,000 bbl. daily and supply most of the 65,000 bbl. daily domestic demand. A 2,500-bbl. plant at Cabaiguan has already been taken over by the government. It had belonged to owners who were too close to the fallen Batista regime.

The government already is operating a number of enterprises in other industries.

The local affiliate of AT&T was put under direct government control 8 months ago. The number of employes has almost tripled and telephone rates have been lowered to the level in effect in 1909. The present management hopes to float a multimillion dollar loan to pay debts which in the meantime have fallen in arrears.

Fresh-Water Plant Developed

A NEW TYPE distillation plant has been developed to help overcome fresh-water shortages in some of the world's isolated oil fields.

The new plant works under some conditions where other types can't. Two of the units have been operating satisfactorily for more than 6 months in the Neutral Zone, where water previously had to be hauled 50 miles.

The unit, known as Subcome Water Plant, is based on a submerged gas burner that generates steam directly from any available source of brackish or sea water. The design was developed by Gail C. Rogers of Carroll Bradberry & Assoc., consulting engineers, Los Altos, Calif.

Behind the project were trials that showed not enough water was available at Aminoil's Wafra gathering station to operate a flash evaporator or multiple-effect plant. Thermo-compression plants, which operate normally on the coast on Persian Gulf water, became completely inoperative after 1 or 2 days operation in the desert area due to scale plugging of tubes.

The plant uses natural gas as fuel, no drawback in Wafra where flare gas is available. A 10,000-gal.-daily and a 25,000-gal.-daily plant have been installed at initial costs almost identical with other types of units. Operating experience has shown advantages include:

. . . **Almost any kind** of raw water can be used.

. . . **From 50% to 75%** of feedwater is converted to distilled water, important in desert operations where even brackish well water is sometimes limited.

. . . **The distilled water** can be used in all field operations.

. . . **Any gas fuel** can be used, providing composition is known to permit proper burner design.

How unit works . . . The units are on stream 28 out of 30 days. The down time is needed to service engines and remove accumulated scale from the burner vessels.

In operation, air and gas at 8 to 10 psi. are fed to a submerged burner installed in a steel vessel partially filled with water. The direct transfer of heat from hot combustion gas generates steam directly, eliminating troublesome scale formation.

Scale does form on the surface of the burner tube due to heat and very high calcium sulfate content of the feedwater. But after building up to a thickness of about ⅛ in., the scale pops off the burner and falls to the bottom.

Steam and combustion gas from the evaporator are cooled by air in order to condense the distilled water, which is sent to storage. Raw water could be used in cooling in areas where it is plentiful.

Because the distilled water absorbs carbon dioxide from combustion gas, the product water has a pH of about 5.9. This is adjusted to pH 8.5 by the injection of dilute sodium hydroxide solution.

The final product water has a total solids content of about 100 parts per million, compared with 22,700 p.p.m. in raw Wafra water.

New Deal Due Venezuela's Petrochemical Firm

• With a new president and a more businesslike attitude, Petroquimica hopes to be out of the red in about 4 years.

VENEZUELA'S scandal-ridden Petrochemical Institute may change from a white elephant to a profit-making organization in 4 years.

Dr. Edgard Pardo Stolk, the new president of Petroquimica, has no illusions about the problems faced by the government-owned organization. But he is optimistic it will be operating in the black 2 years after facilities are completed in 1961.

This optimism is one of the reasons behind a government decision to wrestle the problem itself, rather than sell or lease the facilities to private companies.

Petroquimica was probably the most notorious program undertaken by the former government led by Gen. Perez Jimenez. A total of $180 million has been invested in facilities so far, and another $60 million is needed to complete the development.

To show for this investment there is an 1,800-bbl. refinery, and a partially completed natural-gas pipeline system, fertilizer plant, and chlorine and soda ash plant.

Dr. Pardo says candidly these facilities could probably have been built for less. Because of the program's bad reputation, several pending Petroquimica projects have been deliberately postponed to give the new management a chance to prove present facilities can be operated efficiently.

The 54-year-old president says the 1,800-bbl. refinery was too small ever to have been built in the first place. The plant has been running at a loss. In trying to bring it into the black, Dr. Pardo is following the same steps refiners are taking in many other places. He is trying to reduce the staff, tailor output of products to demand, and develop new markets.

Hiring policy . . . Dr. Pardo says political featherbedding also has ended. Job applicants still come through personal and political channels. But there must first be a vacancy, and the candidate must be qualified before a post is filled.

Chlorine and soda ash are made at the rate of 10,000 tons each per year by a German electrolytic process. The ash has a ready market. But chlorine stocks build up, and the plant is shut down periodically until chlorine supplies can be worked off. When this part of the program is completed, calcium chloride and calcium hydrochloride also will be produced.

A mixing plant will deliver this year about 30,000 tons of fertilizer made from foreign chemicals. This is an increase from 17,000 tons last year. The problem is one of marketing in a country where most farmers are unfamiliar with fertilizer and must be sold on it. Eventually the Petroquimica plant will produce 160,000 tons of its own fertilizer per year.

Two out of three sections of a natural-gas-pipeline system from Anaco to Moron have been completed. These are from Anaco to Caracas, and from Valencia to Moron. Pending completion of the link from Caracas to Valencia at the end of the year, Petroquimica is making use of a privately-owned line running between the same points. Another section, running from Valencia to Barquisimeto, will be started next year. It is scheduled for completion in 1962.

Drilling Halted on Burma's Deepest Test

THE DEEPEST well ever drilled in Burma has been bottomed at 13,108 ft. in the Irrawaddy Delta.

Drilling has ended at the Payagon 1 wildcat, in Pyapon District, and production tests are about to start. But Burmah Oil Co. (1954), Ltd., indicated that no oil had been found, either at Payagon or in five other deep tests drilled in the past 2 years.

The latest test is the third drilled in the Irrawaddy Delta. A deep test at Dedaye was abandoned in June at 11,000 ft. Noncommercial gas had been encountered at about 10,000 ft., but the formation had low permeability. A test at Kyaiklat was abandoned at 12,000 ft. last December, after finding traces of oil and gas.

Three other deep wildcats have been drilled in central Burma, where the country's present 10,000 bbl. daily production is located. One of these was Chauk 1,000, drilled in a 55-year-old field that produces most of the country's crude. Two other wells have been drilled without success at Ondwe.

The next wildcat will be drilled near Pogaung, a few miles west of Thonze in Tharrawaddy district.

Gulf Gets Acreage in Spanish Africa

THE FIRST concession awarded in Spanish Africa under Spain's new oil law has gone to Gulf Oil Corp.

Gulf and a Spanish partner, CEPSA, have won concessions covering 328,000 acres in Spanish Guinea, a small province on the west coast of Africa, north of Gabon. The companies are to spend up to $7,750,000 in an exploration program in the next 6 years.

The award is the first since bidding closed on applications for exploration rights in Spain itself and in its African territories.

Competition for the Spanish Sahara has been much more intense, and overlapping bids have held up awards. Thirty-five of 108 blocks into which the territory has been divided are considered promising. There are 162 applications for these 35 zones.

Most of the major companies have made applications for rights in the Sahara area as well as for acreage on the Spanish mainland.

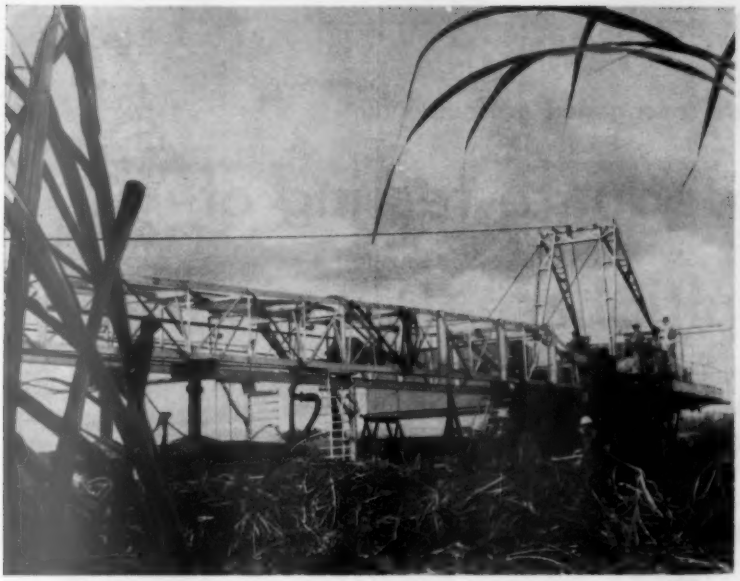
Yemen Concession Awarded

YEMEN, a small kingdom on the Red Sea at the southern tip of the Arabian peninsula, has granted an oil and gas concession to the American Overseas Investment Corp.

The concession, which calls for a 50-50 profit split, on any oil or gas discovered, covers 10,000 sq. miles on the northwest coastal plains and offshore.

The concession was awarded by Yemen Crown Prince Mohammed El Badr. Also granted was a minerals concession covering the entire kingdom.

The investment firm is headed by a former State Department security officer in the Middle East, W. Angie Smith III of Oklahoma City. Board members of the firm, organized earlier this year, include Oklahoma, Texas, and Louisiana business men.



DRILLING rig being set up in sugar cane field near Santa Isabel, and . . .

Puerto Rico's First Test Under Way

THE FIRST oil test in Puerto Rico's history has been spudded in about 30 miles east of Ponce near Santa Isabel on the southern coast.

The well, projected to 7,500 ft., is being drilled by David L. Gordon, Houston independent, and Kewanee Oil Co. in a joint venture. The test is on a 200,000-acre concession held by Gordon, president of Maritime Oil Co.

The test, in a field of sugar cane, is about 20 miles from Guayanilla, site of Commonwealth Oil Refining Co.'s refinery.

Gordon's concession includes both offshore and onshore acreage. He acquired the acreage early in 1958 after the Puerto Rican Commonwealth revised its concession law to attract oil exploration.

Gas Plants Slated

. . . in Venezuela by Colon, Creole, and Mene Grande.

COLON Development Co. will build a gas-injection plant at West Tarra field, southwest of Lake Maracaibo.

The Royal Dutch company, which is in the process of being consolidated with the bigger Cia. Shell de Venezuela, has received permission from the Ministry of Mines for the project.

The plant will be equipped with four low-pressure compressors with a total capacity of 6 million cubic feet daily and one high-pressure compressor with a capacity of 10 million cubic feet daily. Gas will be injected into Cattatumbo reservoir at the rate of 7 million cubic feet daily. Another 9 million cubic feet daily will be delivered to a power plant at La Fria, Tachira, owned by the government's Venezuelan Development Corp.

Anzoategui project . . . Another new gas conservation project has been planned by Creole Petroleum and Mene Grande.

The Ministry of Mines has approved construction of a jointly-owned compression plant in East Soto field in the State of Anzoategui, in Eastern Venezuela. The plant will have two compressors handling a total of 15.5 million cubic feet daily.

FOREIGN BRIEFS . . .

Bolsa Chica Oil Corp., Los Angeles, has abandoned its fourth test on a 370,000-acre exploration license in southeastern Turkey. Several shows were encountered in the 6,138-ft. 1 Sylvan, but drill-stem tests failed to indicate commercial possibilities, the company reported. With abandonment of the fourth wildcat, Bolsa Chica suspended its operations in Turkey.

Japan's first successful offshore well has been brought in west of Akita City in the Sea of Japan. The SK 1 flowed at the rate of 124 bbl. daily from a zone from 1,775-1,908 ft. Total depth of the well is 4,760 ft. The test was made by Japan Oil Resources Development Co. from a LeTourneau platform a little more than a mile from shore.

A $17.5-million exploration budget for exploration and development work in French Equatorial Africa has been planned for next year by Petroles d'Afrique Equatoriale Francaise and its partners. The investment will be made in Gabon and Congo Republic. SPAEF will spend $13.8 million of the total. Its partners on joint-venture areas, Mobil Oil and Royal Dutch-Shell, will spend $3.6 million.

Construction will start next year on a new Polish refinery at Plock, northwest of Warsaw, that will triple the country's refining capacity.

The 40,000-bbl. plant will fill 70% of local demand when it is fully on stream, scheduled for 1965. The refinery also will supply feedstocks for an adjacent petrochemical complex. Crude for the plant will be delivered by a pipeline system being built from Russia into eastern Europe.

A 35-mile 6-in. gas line is being laid by Attock Oil Co. from Fenchu Hanj to Wah, Pakistan. Contracting & Trading Co., Beirut, Lebanon, the contractor, expects to complete the job in February 1960. Contracting & Trading also is laying 20 miles of 30-in. for Iraq Petroleum Co. from the Lebanon-Syria border to Tripoli. The project will be finished by April 1960.

The 250-mile 30 and 32-in. looping project on the Iraq Petroleum line from Kirkuk field has been started by Turriff-Burden, Ltd. Right-of-way and ditching has been in progress for several days and pipe laying is ready to begin. Turriff-Burden also will lay 65 miles of 30-in. in southern Iraq between Rumaila and Fao. The two projects will be completed in 2 years.

Pipeline problems of the Consortium in Iran are being analyzed by Pipe Line Technologists, Inc., Houston, and Middle East Consultants, Teheran.

Here's a suggested procedure for

Adequate testing of multiphase-flow pipelines

This procedure is directed specifically at two-phase, two-component flow, but it may be modified for the case of two or more liquid phases. Measurements and properties necessary to evaluate test data are included.

BY ORIN FLANIGAN, ET AL.

The senior author, Orin Flanigan, is a member of the engineering staff of Arkansas Louisiana Gas Co. Coauthors are members of the AGA-API Committee on Two-Phase Flow and include the following: T. S. Bacon, Lone Star Gas Co.; Ovid Baker, Mobil Oil Co.; A. L. Berry, Westcoast Transmission Co.; H. A. Brainerd, Sinclair Pipe Line Co.; J. D. Peterson, Atlantic Refining Co.; R. V. Smith, Phillips Petroleum Co.; and T. R. Young, Shell Pipe Line Corp.

SEVERAL thousand miles of multiphase pipelines are in operation at present and more are being built. Multiphase flow also occurs in heat-transfer equipment and in oil and gas wells. There are many individual reasons why more knowledge of multiphase flow is desirable, but the majority are concerned with:

1. The design of new lines or equipment for the most economical size.
2. The performance of existing lines or equipment under altered conditions.
3. The effect of alterations upon the performance of existing lines or equipment.

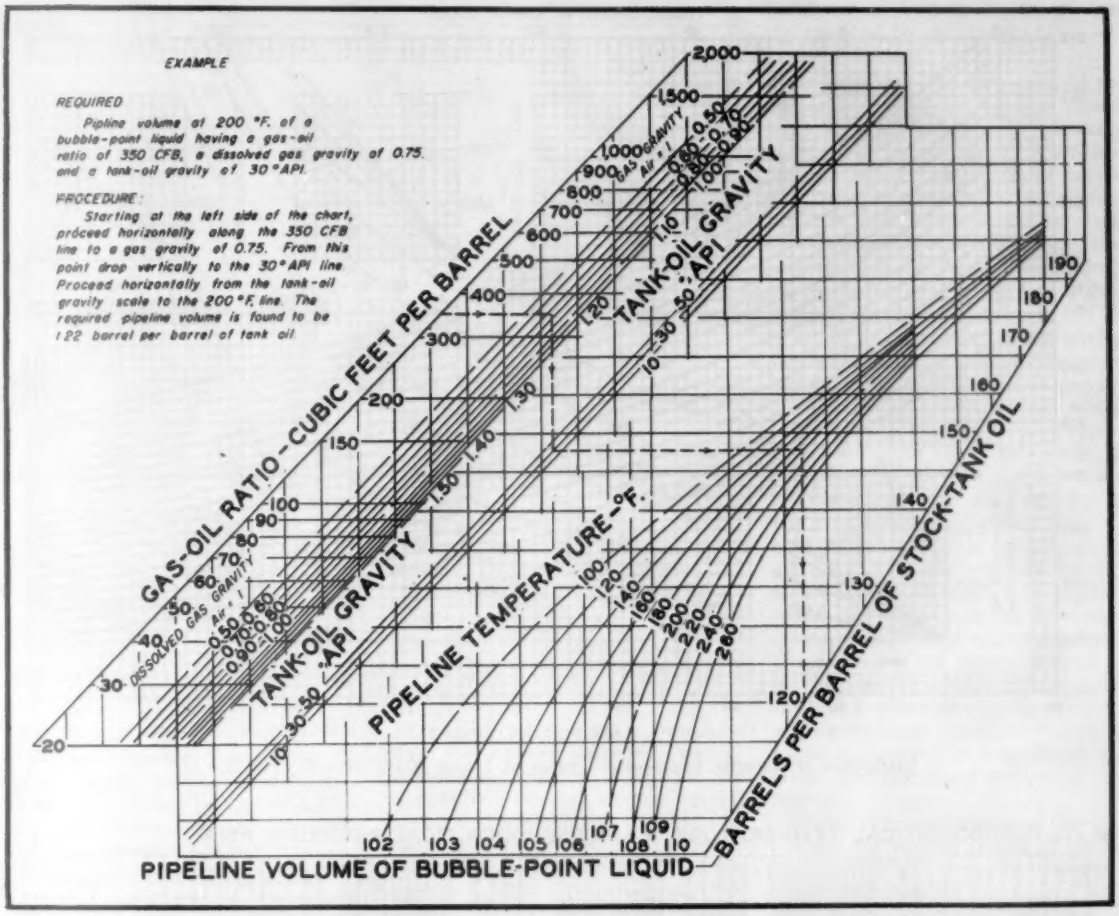
The study of multiphase pipeline performance requires valid test data. The AGA-API Committee on Multiphase Flow is currently engaged in collecting laboratory and field data on two-phase flow. Experience has shown that in many cases, field tests have not included sufficient information for the full utilization of the test data. In all cases, the method of reporting the data varies greatly. Purpose of this article is to present a procedure for the adequate testing of two-phase pipelines and to suggest a standard form for reporting the data.

The theoretical status of two-phase flow is still in a state of flux. But a

TABLE I—METHODS OF OBTAINING DESIRED DATA

Symbol	Quantity	Method of Measurement*
L	Line length	Direct measurement
ΔH	Elevation difference	Direct measurement
ΣH	Summation of rises	Direct measurement
D	Line diameter	Direct measurement
T	Line temperature	Direct measurement
P_1	Upstream pressure	Direct measurement
P_2	Downstream pressure	Direct measurement
Q_{GPL}	Pipeline gas flow rate	1. Direct measurement by orifice meter at pipeline pressure. 2. Calculate by equilibrium vaporization calculation from composite separator-gas flow rate, liquid stock-tank flow rate, composite separator-gas analysis, liquid stock-tank analysis, pressure, and temperature. 3. Estimate from composite separator-gas flow rate, liquid stock-tank flow rate, and gas-to-oil ratio.
Q_{LPL}	Pipeline liquid flow rate	1. Direct measurement by meter at pipeline pressure. 2. Calculate by equilibrium vaporization calculation. 3. Estimate from high-pressure g.p.m. measurement. 4. Estimate from stock-tank-liquid flow rate, gas-oil ratio, and dissolved-gas gravity by the use of Fig. 1.
ρ_{LPL}	Pipeline liquid density	1. Calculate from analysis of pipeline liquid. 2. Estimate from the liquid stock gravity, gas-oil ratio, and dissolved-gas gravity by the use of Fig. 1.
S_{GPL}	Pipeline gas specific gravity	1. Direct measurement. 2. Calculate from pipeline-gas analysis. 3. Calculate from composite separator-gas gravity, gas-oil ratio, and dissolved-gas gravity.
μ_{GPL}	Pipeline gas viscosity	1. Determine from temperature, pressure, and pipeline-gas gravity by the use of Figs. 2, 3, and 4.
μ_{LPL}	Pipeline liquid viscosity	1. Determine from temperature, pressure, and liquid molecular weight by the use of Fig. 5. 2. Determine from stock-tank liquid viscosity and gas-oil ratio by the use of Fig. 6.
σ	Pipeline liquid surface tension	Calculate by various methods.

*Where more than one method of measurement is listed, the preferred method is listed first.


EXAMPLE
REQUIRED
Pipline volume at 200 °F. of a bubble-point liquid having a gas-oil ratio of 350 CFB, a dissolved gas gravity of 0.75, and a tank-oil gravity of 30 °API.
PROCEDURE:
Starting at the left side of the chart, proceed horizontally along the 350 CFB line to a gas gravity of 0.75. From this point drop vertically to the 30° API line. Proceed horizontally from the tank-oil gravity scale to the 200 °F. line. The required pipeline volume is found to be 1.22 barrel per barrel of tank oil.
GAS-OIL RATIO-CUBIC FEET PER BARREL
DISSOLVED GAS GRAVITY Air = 1
0.50 0.60 0.70 0.80 0.90 1.00
TANK-OIL GRAVITY °API
PIPELINE TEMPERATURE-°F.
BARRELS PER BARREL OF STOCK-TANK OIL
PIPELINE VOLUME OF BUBBLE-POINT LIQUID

SHRINKAGE of crude oils.[7] Fig. 1.

survey of the various calculation methods in use shows that there are a number of essential measurements and properties which are necessary for adequate evaluation of the test data. The measurements and properties which are believed to be necessary are included here. While this procedure is directed specifically at two-phase, two-component flow, it may be modified for the case of two or more liquid phases.

No attempt is made to present a method of evaluating the performance of multiphase pipeline. It is hoped that this procedure will result in the collection of additional field data. The AGA-API Committee on Multiphase Flow would welcome any data collected for inclusion in its data bank. Any data so collected may be addressed to the author or to any committee member.

Test Data and Procedure

Considerably more data are required for the evaluation of multiphase pipelines than for single-phase lines. Table 1 lists the data which are desired and the various means of obtaining them.

Line length . . . The line length and line diameter can best be obtained from an inventory map. It is recommended that line sections of constant inside diameter be chosen.

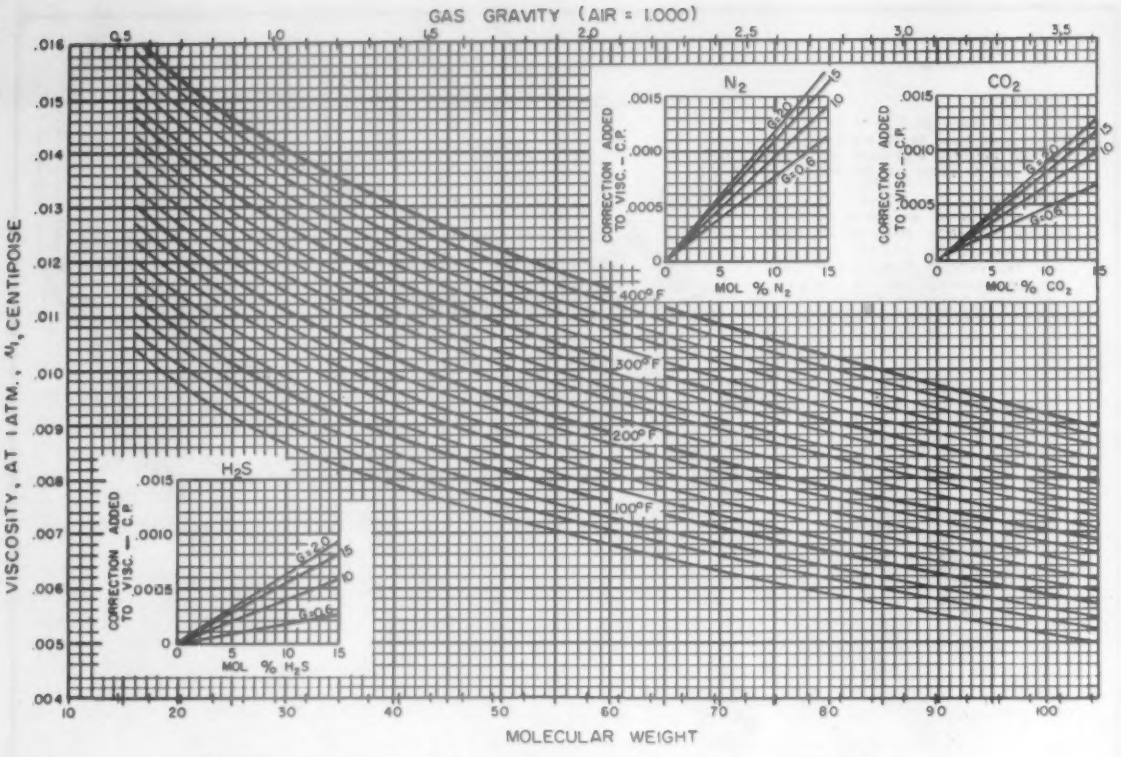
Elevation changes . . . The elevation difference between the terminals of the pipeline section, ΔH, and the summation of the uphill rises, ΣH, can most accurately be obtained from a profile of the pipeline. Topographic quadrangle maps published by the U. S. Geodetic Survey and the National Topographic Series in Canada are useful in selecting sections to be tested.

These maps, however, usually have contours at 20-ft. intervals. Because of this, a large number of small rises are not shown and the use of these maps to obtain ΣH can produce considerable error. If a profile of the line is not available, a tabulation of all high and low points along the pipeline will suffice.

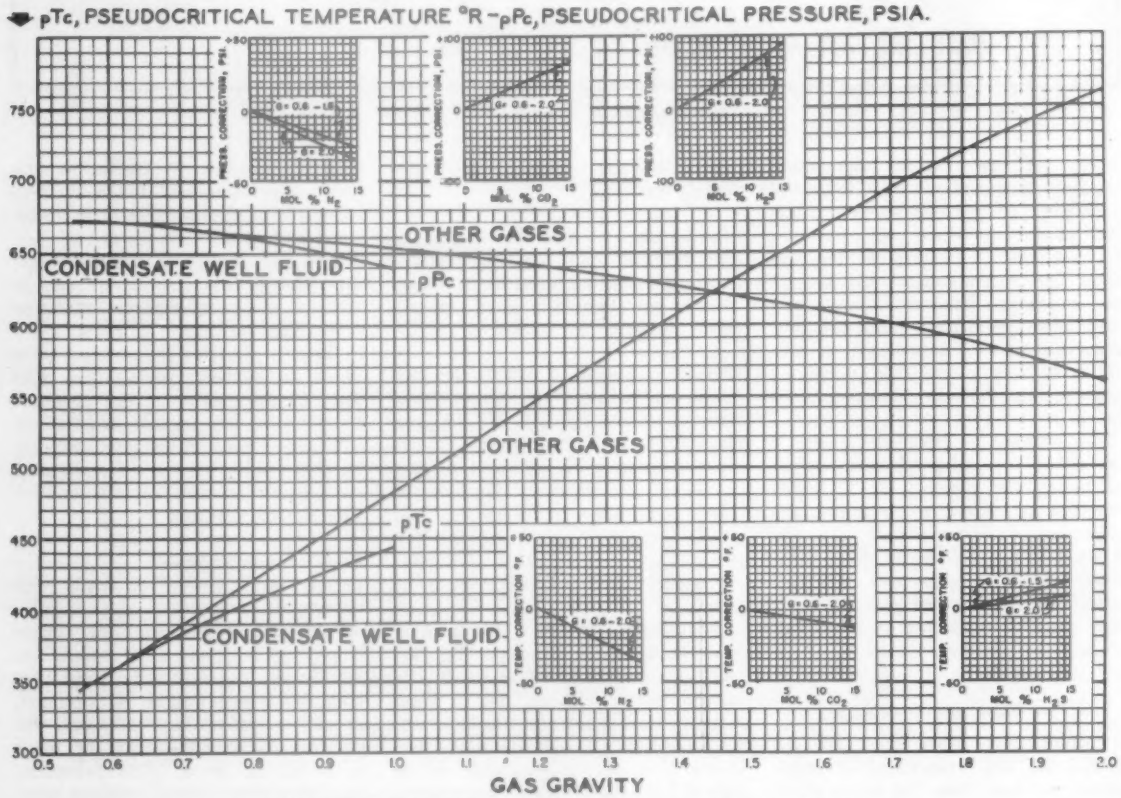
Line temperature . . . Sufficient temperature mesurements should be made along the pipeline to determine an average temperature of the test section. If the test section is some distance downstream from any compressor or well, a single temperature measurement may suffice.

Since it is normally not practical to insert thermometer wells into a pipeline, measurements of the pipe-wall temperature are usually satisfactory. The temperature of the pipe wall may be obtained by placing a thermometer bulb firmly against the pipe and insulating the junction.

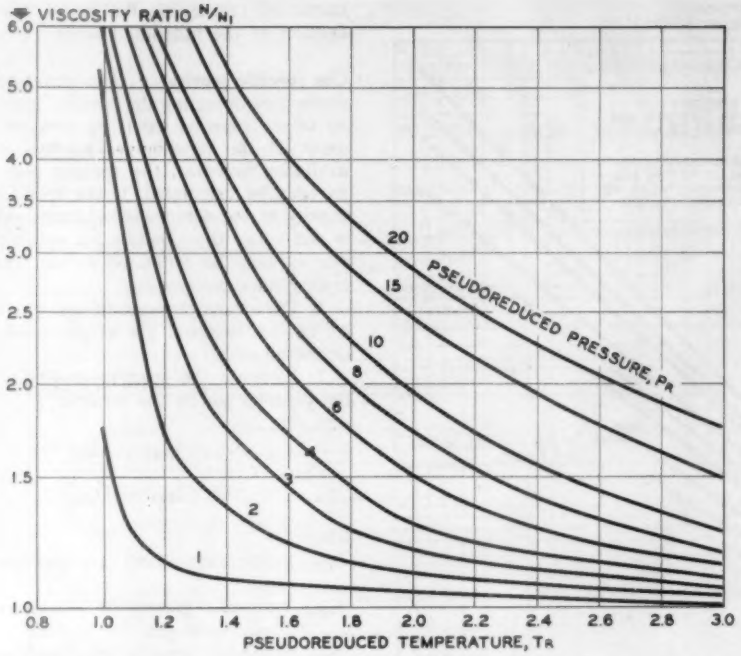
Pressure measurements . . . Pressure measurements should be made with calibrated dead-weight gages capable of measuring to 0.1 psi. The weights belonging to each gage should be numbered consecutively, beginning with the largest weight. At all times, in calibration or in field work, the addition of weights should be made in numerical order. This procedure simplifies correction of pressure readings, as it eliminates the necessity of



VISCOSITY of paraffin hydrocarbon gases at 1 atm. (Carr, et al.[5]). **Fig. 2.**



PSEUDOCRITICAL PROPERTIES of hydrocarbon gases (Carr, et al.[5]). **Fig. 3.**



VISCOSITY RATIO of hydrocarbon gases at high pressure (Carr, et al.[5]). Fig. 4.

keeping a record of the weights used.

As a minimum precaution, the gages should be calibrated with a dead-weight tester, or against one of the gages chosen as standard. The following procedure is recommended for checking each gage against the standard: The gages are manifolded, the No. 1 weights are placed on the gage platforms, and sufficient pressure is applied to raise both platforms and to bring one into balance.

If one platform is too light and rises, sufficient weight should be added to bring it into balance. This weight, if it has been added to the standard, becomes a positive correction, and it is a negative correction if added to the gage under test. This process is repeated with weights Nos. 1 and 2 on the platforms, then weights Nos. 1, 2, and 3, and so on until all of the available weights have been added. By this procedure the reading of all gages can be corrected to those of the standard.

Since absolute pressures are desirable, it is necessary to obtain barometric pressure measurements at the pressure measuring points. Atmospheric pressure variations due to changes in elevation and local weather conditions can be important, particularly for tests at small pressure drops.

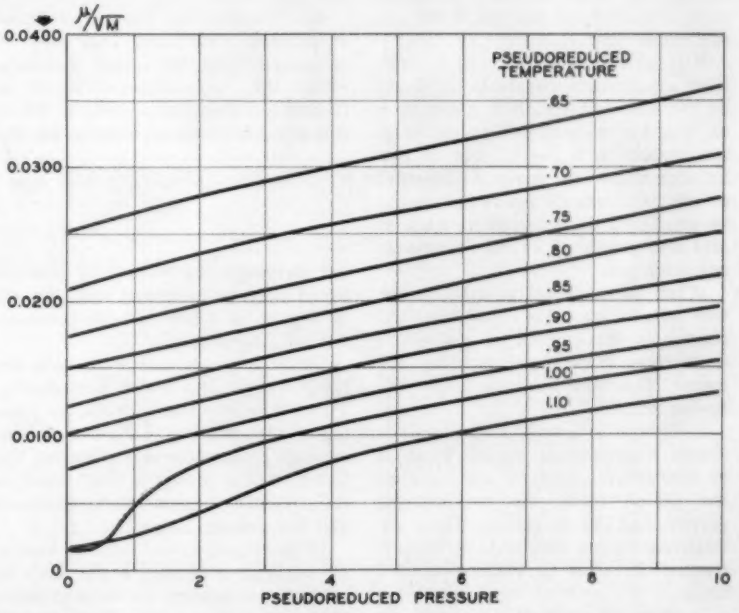
Pressure measurements at the terminals of a pipeline section should be made simultaneously. In order to accomplish this, radio communication will probably be necessary. In many cases, the pressures in a two-phase flow line will be fluctuating rapidly as much as 1 psi. even though the line is stabilized. Because of this, several pressure measurements should be made on a given section at 5-minute intervals. It is recommended that the upstream pressure measurements be averaged to give P_1 and the pressure drops be averaged to give ΔP. The downstream pressure P_2 would then be obtained by difference.

Flow rates . . . The flow rates of the gas and liquid in the pipeline should preferably be obtained by metering the high-pressure streams. When orifice meters are used to measure the gas flow rate, the orifice installation and the calculations should be made in accordance with the American Gas Association's Gas Measurement Committee Report No. 3, "Orifice Metering of Natural Gas."

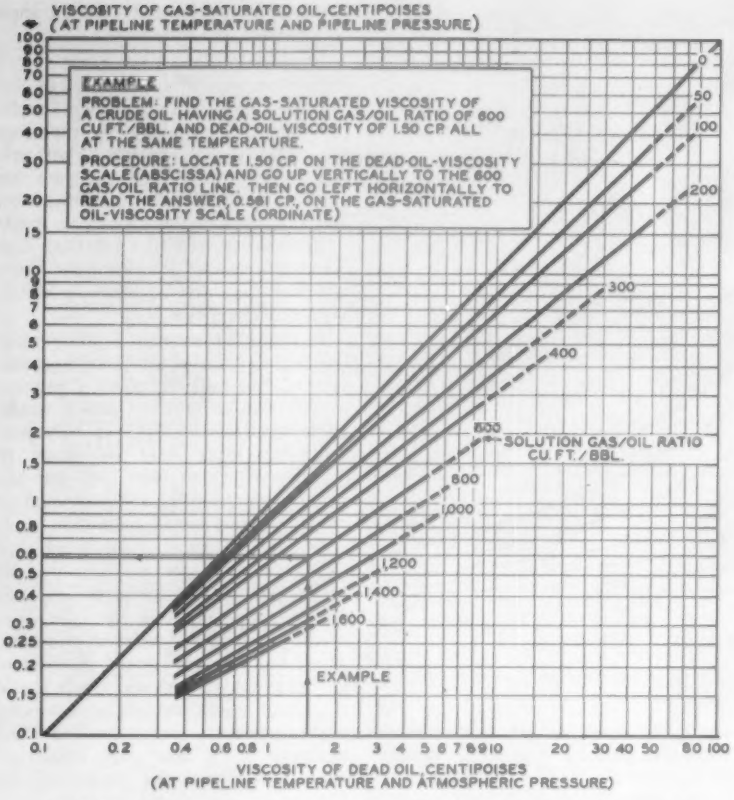
If the high-pressure liquid stream is metered with positive-displacement meters, care must be taken to prevent a reduction in pressure which would allow some of the liquid to be vaporized. Reference may be made to ASME-API Code No. 1101 for the installation, proving, and operation of positive-displacement meters.

In many cases it is more convenient to reduce the pressure on the liquid and gas streams at the pipeline outlet and to measure the flow rates of the fluids at the reduced pressures. These volumes are usually referred to as "stock-tank" volumes. While liquid stock-tank measurements are normally made once a day, provisions should be made to insure that gage levels are taken throughout the period of the test.

When the measurement of the liquid and gas streams is carried out at conditions which are different from those existing in the test section, corrections must be made on volumes of gas and liquid. Although the total



VISCOSITY of liquid hydrocarbons (Bircher and Katz[3]). Courtesy of Industrial and Engineering Chemistry. Fig. 5.


VISCOSITY OF GAS-SATURATED OIL, CENTIPOISES
(AT PIPELINE TEMPERATURE AND PIPELINE PRESSURE)
EXAMPLE
PROBLEM: FIND THE GAS-SATURATED VISCOSITY OF A CRUDE OIL HAVING A SOLUTION GAS/OIL RATIO OF 800 CU FT./BBL. AND DEAD-OIL VISCOSITY OF 1.50 CP ALL AT THE SAME TEMPERATURE.
PROCEDURE: LOCATE 1.50 CP ON THE DEAD-OIL-VISCOSITY SCALE (ABSCISSA) AND GO UP VERTICALLY TO THE 800 GAS/OIL RATIO LINE. THEN GO LEFT HORIZONTALLY TO READ THE ANSWER, 0.581 CP, ON THE GAS-SATURATED OIL-VISCOSITY SCALE (ORDINATE)
0
50
100
200
300
400
500
SOLUTION GAS/OIL RATIO CU. FT./BBL.
800
1,000
1,200
1,400
1,600
EXAMPLE
VISCOSITY OF DEAD OIL, CENTIPOISES
(AT PIPELINE TEMPERATURE AND ATMOSPHERIC PRESSURE)

VISCOSITY of gas-saturated crude oils (Chew and Connally[6]). Fig. 6.

mass flow rate remains the same, the ratio of gas flow rate to liquid flow rate changes with temperature and pressure. The best method of making this correction is by performing an equilibrium vaporization calculation using the chemical analysis of the gas and liquid phases.

It is recommended that the equilibrium vaporization constants published by the National Gasoline Association of America be used. When the pressure reduction is carried out in two or more stages, the physical properties of the gas from all separators should be combined on a weighted basis to give the properties of the composite separator gas.

When the chemical analyses of the two phases are not available, the change in the amount of gas which is dissolved in the liquid must be estimated. This may be done in the following manner:

1. Obtain a sample of the gas-saturated high-pressure liquid. Flash it to atmospheric pressure and measure the gas-oil ratio, the dissolved-gas gravity, and the oil gravity. These are relatively simple tests and can be performed in most petroleum laboratories.

2. From the gas-oil ratio and the stock-tank liquid flow rate, calculate the total amount of gas dissolved in the high-pressure oil.

3. Subtract the dissolved gas from the volume of composite separator gas to determine the gas flow rate at pipeline conditions.

4. Determine the volume of liquid at pipeline conditions. This may be calculated from the liquid shrinkage when the high-pressure liquid is flashed to atmospheric pressure. When it is not convenient to observe the liquid shrinkage, the volume of pipeline liquid may be estimated with the aid of Fig. 1 or other suitable pressure-volume relationships.

Most gas-condensate wells have the liquid-to-gas ratio tested periodically. These tests are usually made by passing all or a portion of the well stream through a separator and collecting the liquid at line pressure. This liquid is then flashed to atmospheric pressure and the volume measured.

If the liquid-to-gas ratio is known at two high pressures, a plot may be made for estimating the ratio at intermediate pressures. The flow rate of the pipeline liquid may then be estimated by combining the liquid production of the individual wells.

Gas specific gravity . . . The preferred method of obtaining the specific gravity of the pipeline gas is by measurement. If the pipeline-gas analysis is available, however, the specific gravity may be calculated. If the specific gravity of the composite separator gas is available, the pipeline-gas specific gravity may be estimated in the following manner:

1. Determine the volume and gravity of the dissolved gas as previously described.

2. Estimate the specific gravity of the pipeline gas by the formula:

$$S_{GPL} = \frac{Q_{GST}\, S_{GST} - Q_{GD}\, S_{GD}}{Q_{GST} - Q_{GD}}$$

where,

S_{GPL} = specific gravity of pipeline gas
S_{GST} = specific gravity of composite separator gas
S_{GD} = specific gravity of dissolved gas
Q_{GST} = flow rate of composite separator gas
Q_{GD} = flow rate of dissolved gas

Liquid density . . . The density of the pipeline liquid should preferably be calculated from an analysis of the pipeline liquid. When this analysis is not available, the density may be estimated in the following manner:

1. Determine the gas-oil ratio and the specific gravity of the dissolved gas in the manner previously described.

2. Determine the barrels of pipeline liquid per barrel of stock-tank liquid with the aid of Fig. 1.

3. Calculate the density of the pipeline liquid by the formula:

$$\rho_{LPL} = \frac{5.61\ \rho_{LST} + 0.0764\ S_{GD}\ (GOR)}{5.61\ F}$$

Gas viscosity . . . The most accurate method of obtaining the viscosity of the pipeline gas is by direct measurement at high pressure. Few companies have equipment available for this, however, and sufficient accuracy can be obtained using generalized correlations. One set of generalized correlations is shown in Figs. 2, 3, and 4. Other suitable correlations may be used. The gas viscosity may be obtained in the following manner:

1. From the pipeline-gas molecular weight or specific gravity and the use of Fig. 2, obtain the viscosity of the gas at atmospheric pressure. The insets in Fig. 2 may be used to correct

TWO PHASE FLOW TEST

FINAL DATA TABULATION

	Pipeline designation						
	Test section designation						
	Test number						
L	Test section length, feet						
D	Inside pipe diameter, inches						
ΔH	Elevation increase, feet						
ΣH	Summation of uphill rises, feet						
T	Average section temperature, °F						
P_1	Upstream pressure, PSIA						
P_2	Downstream pressure, PSIA						
Q_{GPL}	Pipeline gas flow rate, MCFD						
Q_{LPL}	Pipeline liquid flow rate, barrels per day						
S_{GPL}	Pipeline gas specific gravity						
S_{GPL}	Pipeline liquid specific gravity						
μ_{GPL}	Pipeline gas viscosity, centipoises						
μ_{LPL}	Pipeline liquid viscosity, centipoises						
Z	Pipeline gas compressibility						
σ_{LPL}	Pipeline liquid surface tension, dynes per centimeter						
P_B	Gas measurement pressure base, PSIA						

GAS ORIFICE METER CALCULATIONS

METER NUMBER	P PSIG	h INCHES	T °F	S_G	BASE COEFF. CFH	F_G	F_{TF}	F_{PB}	F_{PV}	CORRECTED COEFF. MCFD	(P+15)h	$\sqrt{(P+15)h}$	Q MCFD

PRESSURE MEASUREMENTS

LINE DESIGNATION _____

TEST SECTION DESIGNATION _____

TEST NUMBER _____

DATE _____

TEST POINT	TIME	DEAD WEIGHT NUMBER	UNCOR PRESSURE PSIG	D.W CALIBRATION FACTOR	COR PRESSURE PSIG	BAR PRESSURE PSIA	LINE PRESSURE PSIA

DATA SHEETS provide a guide in cases where they are applicable, including calculations and tabulations which are common to most tests.

the atmospheric viscosity for the presence of nonhydrocarbon components in the gas.

2. From Fig. 3, obtain the pseudocritical temperature and the pseudocritical pressure of the pipeline gas.

3. Divide the absolute pressure and absolute temperature of the pipeline gas by the pseudocritical pressure and temperature to obtain the pseudoreduced pressure and temperature of the gas.

4. From Fig. 4, obtain the viscosity ratio of the pipeline gas.

5. Multiply the viscosity ratio by the atmospheric viscosity to obtain the gas viscosity at pipeline conditions.

Liquid Viscosity . . . Liquid viscosity may be obtained in a somewhat similar manner. For condensate and light hydrocarbon liquids, Fig. 5 may be used. For crude oil, the viscosity of the stock-tank liquid should be measured in the laboratory. The viscosity of the pipeline liquid may then be obtained from Fig. 6.

Gas supercompressibility . . . The most accurate method of determining compressibility factors is the direct measurement with a Bean or Burnett apparatus. Ordinarily, however, it is more convenient to make use of a suitable correlation for these factors.

The American Gas Association's "Supercompressibility Factors for Natural Gas" (1955), and "Orifice Metering of Natural Gas" 1955 present correlations of supercompressibility factors, $F_{PV}=(1/Z)^{1/2}$ (Z is the compressibility factor) that are well suited to this use. These correlations require gas specific gravity and carbon dioxide and nitrogen content, or gas specific gravity, heating value, and carbon dioxide content.

Liquid surface tension . . . While surface tension can be measured, it is usually much more convenient to calculate it from other measurements. This may be done in several ways. Baker and Swerdloff [1,2] have published four methods of calculating surface tension. These or other suitable methods may be used.

Line Stability

One of the most important parts of testing a two-phase pipeline is obtaining line stability. It is also one of the most difficult. Whereas a single-phase line can usually be stabilized in a matter of hours, several days are usually required for the stabilization of a two-phase line several miles long.

Because of these wide variations in the time required, no good rules of thumb can be used. There are, however, several general statements which can be made regarding the time required to obtain stability:

1. As the liquid and gas flow rates increase, the time required for stability decreases.

2. As the line diameter increases, the stabilization time increases.

3. As the line length increases, the stabilization time increases.

4. As the summation of the uphill rises (ΣH) of the line increases, the stabilization time increases.

There are three measurements which can be used as an indication of line stability. These are liquid-flow rate, gas-flow rate, and pressure drop. If the inlet and outlet gas and liquid flow rates can be measured, good indication of line stability can be obtained by balancing inputs and outlets of the line. The use of the outlet gas and liquid flow rates alone give a fair indication of stability.

Pressure-drop measurements give a good indication of line stability if they are used carefully. The pressure drop in the line should be observed for several days as the pressure drop sometimes changes very slowly. While it is difficult to set any standard for pressure-drop variation, it is felt that changes in the average pressure drop of 5% or greater during a period of 1 hour represent an unsatisfactory degree of stability.

Data Forms

Since each test has its own distinctive features, it is difficult to prepare a set of data forms which can be used in all cases. There are, however, some calculations and tabulations which occur in a large majority of tests. The data sheets shown are intended to be used as a guide in those instances where they can be applied.

Nomenclature

- D — Internal diameter of pipeline section, in.
- L — Length of pipeline section, ft.
- T — Temperature, °R.
- P — Pressure, psia.
- ΔH — Difference in elevation of terminals of pipeline section, ft.
- ΣH — Summation of the uphill rises (measured vertically) in the pipeline section, ft.
- ρ — Density, lb./cu. ft.
- μ — Viscosity, cp.
- σ — Surface tension, dynes per cm.
- Q_L — Liquid flow rate, B/D.
- Q_G — Gas flow rate, M.c.f.d.
- Z — Compressibility factor of gas.
- S — Specific gravity.
- P_B — Gas-measurement pressure base.
- F — Barrels of pipeline liquid per barrel of stock tank liquid.
- GOR — Gas-oil ratio, cu. ft./bbl.
- M — Molecular weight.

Subscripts:

- L — Liquid.
- G — Gas.
- LST — Stock-tank liquid.
- LPL — Pipeline liquid.
- GST — Composite separator gas.
- GPL — Pipeline gas.
- GD — Dissolved gas.

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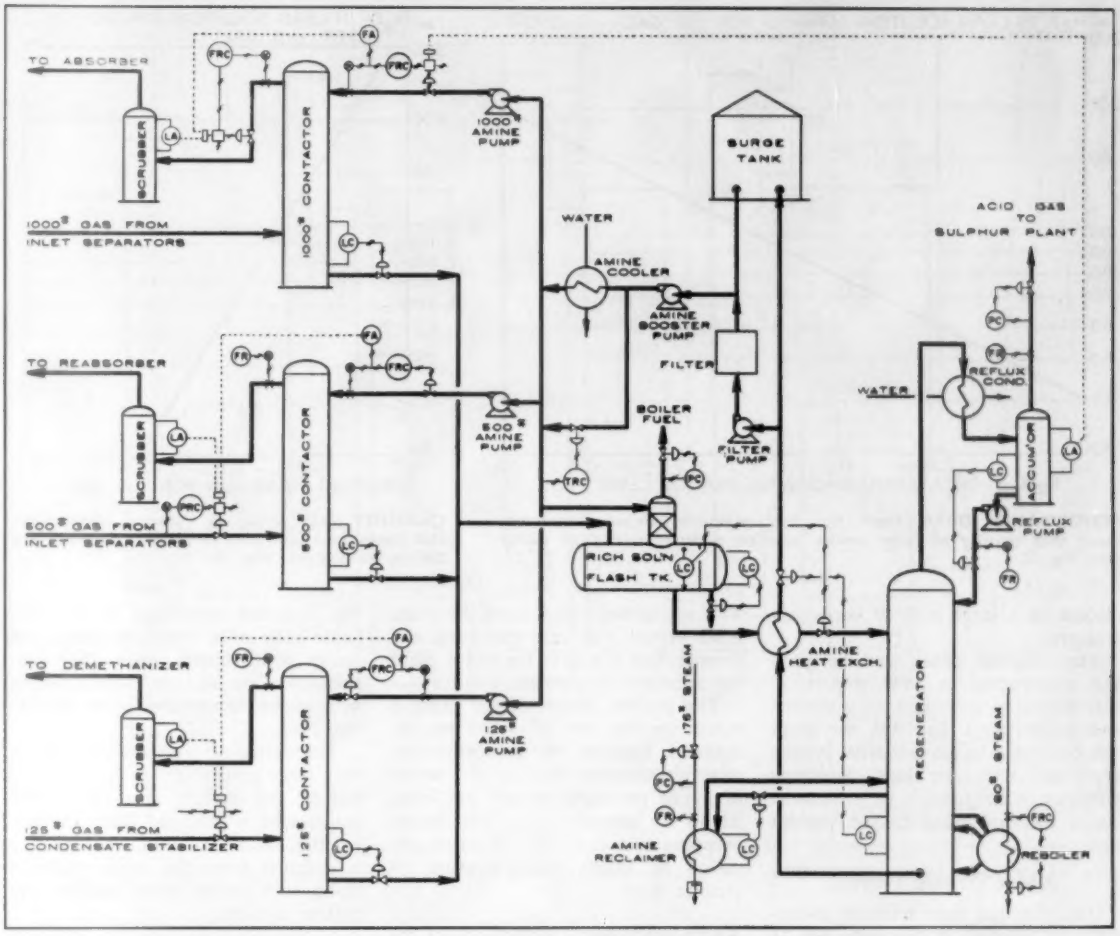


UNUSUAL INSTRUMENTATION is outstanding feature of Pincher Creek amine plant. Fig. 1.

Proper instrumentation keeps outlet gas sweet at Pincher Creek acid-removal and sulfur-recovery plant

BY CHARLES BUSKEL
British American Oil Co., Ltd.

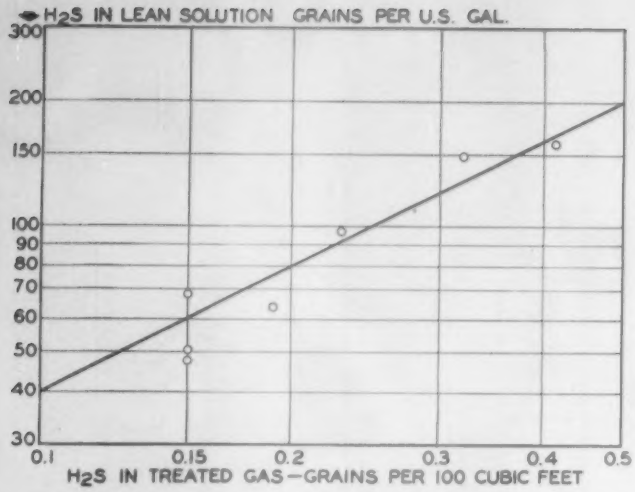
THE AMINE-TREATING SECTION of the Pincher Creek, Alberta, plant is capable of treating in excess of 270,000 M.c.f.d. of sour gas at three different pressures. The individual contactors are so instrumented that either low amine flow or excessive gas flow will shut off gas to that contactor. The contactors are also equipped with flooding or foaming alarms.

Paper presented at CNGA meeting, Los Angeles, 1959.

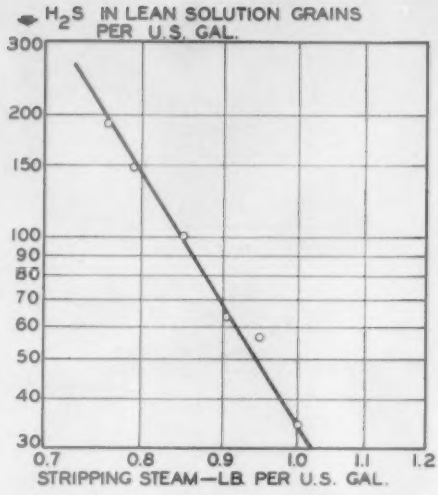
Amine reclaimers and solution filters assure clean amine solution for the contactors. Corrosion in the amine system has been found to be nominal.

Sulfur-recovery facilities consist of three 225-long-ton units, with a fourth similar plant planned for the near future. One of the special features of this installation is an incinerator on each sulfur unit to reduce air pollution from the plant stack.

Sour-gas problem . . . The Pincher Creek gas contains 11% hydrogen sulfide, 6% carbon dioxide, and trace amounts of carbonyl sulfide and carbon disulfide, a total of 17% acid gas. Preparation of such a gas for market was a real challenge since at the time of design, the treating of condensate-type gas containing so much acid gas had not been accom-



PERFORMANCE DATA from the high-pressure amine contactors show that quality of lean amine solution dictates purity of outlet gas. Fig. 2.



QUANTITY of stripping steam determines H_2S content of lean amine solution leaving the amine generators. Fig. 3.

plished on a large scale at such high pressure.

The original plant was designed and constructed in 1955 and 1956 and placed in operation as a cycling and sulfur plant. In 1958 the plant was converted to gas sale with cycling continued only for load-balancing purposes. Construction of additional stages has continued to the present time.

Amine-Treating Process

The plant has three trains of amine-type gas-treating equipment. Fig. 1 is a flow diagram of the amine-treating system. Gas from the high-pressure inlet-gas separators is treated in six 1,000-psi. contactors and then enters the absorbers. In addition, gas from the inlet liquid separator is treated in the 500-psi. contactor before entering the reabsorber. Gas from the condensate stabilizer feed tank and the stabilizer reflux accumulator is treated in the 125-psi. contactor and further processed in the rich-oil demethanizer.

The rich amine solution from the 1,000-psi. contactors along with amine solution from the 500 and 125-psi. contactors is flashed into two rich-solution vent tanks operating at 85 psig. Rich solution from the vent tanks is heated by exchange and fed to the amine-solution regenerators. The regenerator bottom pressure is about 15 to 17 psig., in order to maintain the reboiler temperature as low as possible. Stripping steam is generated by duplicate steam-heated shell-and-tube reboilers on each regeneration unit, either of which may be removed from service for maintenance. The regenerator is refluxed with water condensed from the overhead vapor. The acid gas from the regenerators is sent to the sulfur plant for recovery of elemental sulfur.

The process design of the plant is based on the use of a 20 wt. % aqueous solution of monoethanolamine circulated at the rate of 3 moles of amine per mole of acid gas using 21 to 25 contact trays. The design stripping rate is 1.2 lb. of steam per gallon of amine solution using 19 contact trays.

Amine contactors . . . Because of the high acid-gas content and the desire to produce "quarter-grain" sweet gas in a single stage, 25 trays have been installed in the main contactors. The success achieved in this respect is indicated in Fig. 2 which shows that at Pincher Creek the purity of the 1,000-psi. treated gas is a function of the quality of the lean amine solution. The data shown were obtained at loadings of 0.3 to 0.4 mole of acid gas per mole of amine. Similar results have been obtained at loadings exceeding 0.5 mole of acid gas per mole of amine. The pattern of points indicates that the treated gas has reached substantial equilibrium with the lean amine. This tends to demonstrate that the gas quality is independent of the rich-amine-solution loading provided sufficient amine is present to chemically unite with the acid gas and provided there are sufficient trays to separate the reaction zone and the "cleanup" zone.

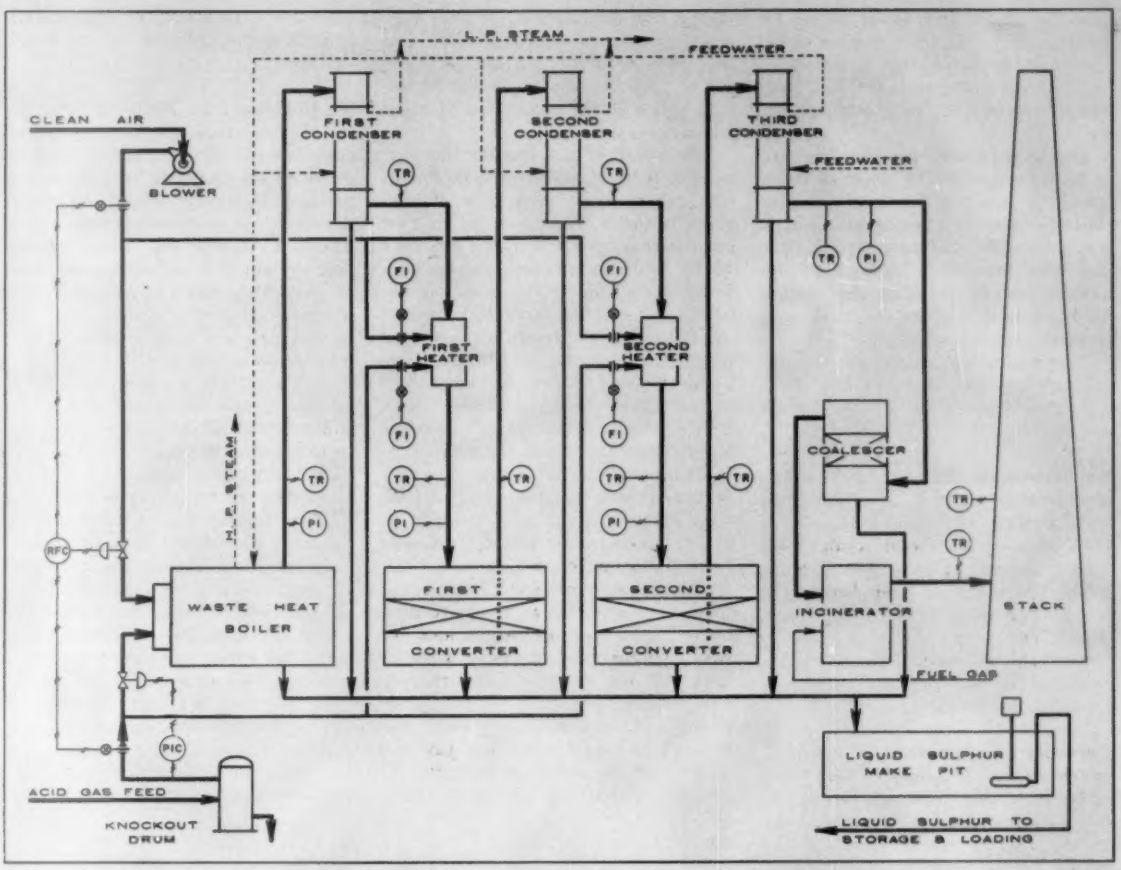
The foregoing indicates that the amine circulation rate and therefore the acid-gas loading of the rich amine solution is not the controlling factor with respect to gas purity. Even so, Fig. 2 is not considered to be a reliable basis upon which to reduce the design requirements, since other considerations are also controlling factors with respect to amine-solution circulation rate.

Test results to date indicate that a very large percentage of the carbonyl sulfide and carbon disulfide in the gas stream is removed from the gas by the amine solution and in turn is stripped from the amine solution along with the hydrogen sulfide and carbon dioxide.

Contactor arrangement . . . The arrangement of the six 1,000-psi. contactors is such that any contactor may be removed from service without disturbing the operation of the remaining units.

Each of the contactors is potentially subject to foaming due to the presence of hydrocarbon liquid. This trouble has occurred, and either greatly reduces the capacity or completely upsets the system depending on the amount and type of hydrocarbon liquid in the system. In order to prevent entrainment and slugging of hydrocarbon liquid into the amine contactors, extra-large inlet separators have been installed. This was only partially successful in eliminating foaming until the temperature of the lean amine to the contactors was increased sufficiently to prevent hydrocarbon condensation from the gas phase when in contact with the cold metal of the contactors. Foam inhibitor has been very successful in settling the foam caused by operating upsets.

Instrumentation . . . Each high-pres-



AIR POLLUTION from sulfur-recovery units is reduced by converting residual H_2S to SO_2 in incinerators provided on each unit. Fig. 4.

sure contactor is capable of treating in excess of 45,000 M.c.f.d. of inlet gas while circulating 1,200 g.p.m. of amine solution although design rates are below these figures. Each amine contactor at Pincher Creek is equipped with an amine flow controller so arranged that a predetermined low amine flow will shut off the gas to the contactor. Each contactor also has a limit flow controller, to prevent an excessive gas flow through that contactor. Purpose is to assure that the outlet gas does not become sour due to minor upsets.

Each amine contactor has a pressure - differential recorder equipped with high differential alarm for sensing the differential pressure across the tray section. This permits the contactors to be operated at high load factors with assurance that any flooding or foaming will be detected in time to be remedied.

The amine-solution outlet valves from the high-pressure contactors are in extremely severe service. Extra-heavy top works and positioners are required to cope with the extreme vibration. Stainless-steel inner valves with stellite faces have failed in a few months. We are now trying specially shaped inner valves and seats, all surfaces of which have been stellited.

Rich-solution flash tank . . . The rich solution from the high-pressure contactors contain 0.18 cu. ft. of dissolved gas per gallon of lean amine solution circulated. Over 80% of this gas is liberated in the flash tank and after a mild contact with fresh amine is used as boiler fuel. The flash tank is also equipped with a classifier for separating hydrocarbon liquid from the amine solution. Since installing this classifier, we have had no major upsets in the amine-regeneration units caused by foaming. Removal of this gas leaves less than 1% of hydrocarbon in the acid gas. This greatly improves the operation of the sulfur plant and probably reduces the corrosion on the rich side of the amine-solution exchanger.

Amine regenerators . . . The degree of amine regeneration is one of the keys to the successful treating of sour gas to pipeline specifications. Fig. 3 shows typical results obtained at Pincher Creek, and shows that the hydrogen sulfide content of the lean solution varies with amount of stripping steam used. The regenerators have 19 trays and the steep slope of the line is due to the effectiveness of the multiple trays in separating the stripping zone from the cleanup zone. In this respect, the multiplicity of trays and the more thorough stripping achieved reduces the concentration of acid gas in the amine solution which in turn reduces the corrosivity of the amine solution in the reboiler.

Amine reclaiming . . . The amount of degradation products formed in the monoethanolamine solution seems to be substantially higher when treating sour gas of high acid-gas content.

Each of the regeneration units at Pincher Creek is equipped with an amine reclaimer designed to handle 2% of the total amine circulated through that unit. Each reclaimer is a steam - heated, reboiler - type unit which receives lean amine solution from the regenerator and which re-

turns the water and amine vapor to the regenerator. The degradation products, being higher-boiling compounds, accumulate in the reclaimer and are periodically removed by manual dumping.

The degradation products appear to be substantially the same as those found in other plants and are exclusively organic compounds. Air is very carefully excluded from contact with the amine throughout the treating system and such degradation products as thiosulfate, oxalates, and formates are not found.

Continuous operation of the reclaimers is considered essential to satisfactory operation of the amine system.

Amine-solution filter . . . Each amine-regeneration unit is also equipped with a filter designed to handle a 10% slip stream. Good results have been obtained using diatomaceous earth. The filter aid is applied to the filter using a precoat mixing tank, stirrer, and pump.

Very finely divided iron sulfide appears to be the principal substance removed by the filters.

Corrosion . . . Corrosion in the amine system has been nominal. This is believed to be due to the metallurgy and fabrication techniques specified, and to the use of conservative process-design criteria such as low regeneration pressure, high stripping-steam rate, and moderate acid-gas loading in the rich amine solution.

The most serious corrosion has occurred in the reclaimer units and to a lesser extent in the reflux condensers. Little evidence of serious corrosion has been found in other parts of the amine system except certain of the amine solution pumps and design changes seem to have remedied this problem.

Sulfur-Recovery Process

Our plans at Pincher Creek provide for the installation of four 225-long-ton per day sulfur-recovery units, a total of 900 long tons per day of capacity. To date, three of these units have been installed. The 225-long-ton size was selected so as to limit the number of units to four, even though at the time of design there were no units in operation of comparable size.

Fig. 4 is a flow diagram of the sulfur-recovery process. Each of the three sulfur plants is a two-stage unit. In each unit, acid gas enters the reaction-furnace portion of the waste-heat boiler where it is partially burned with air.

The air is very carefully controlled so that the combustion gas will contain two parts of sulfur dioxide and one part of hydrogen sulfide. The gas is partially cooled in the waste-heat boiler by the generation of high-pressure steam.

The reaction gas leaving the furnace is further cooled in a shell-and-tube condenser by generation of low-pressure steam. The gas from the first condenser is reheated by an auxiliary burner for temperature control before entering the first-stage converter. The sulfur reaction is exothermic and the heat released greatly increases the temperature of the gas in the converter beds. The gas is then cooled in the second condenser, after which it is reheated to the proper reacting temperature by mixing with hot combustion gas from a second auxiliary burner before entering the second-stage converter.

The second-stage converter causes further reaction of the gas, and additional sulfur is obtained as a result of the condensation in the third condenser. Gas from the third condenser passes through the coalescer in order to knock out entrained sulfur droplets before being sent to the incinerator and the sulfur-plant stack. Sulfur is condensed from the gas and drained to the make pit from the reaction furnace, from each of the three condensers, from the two converters, and from the coalescer of each sulfur unit.

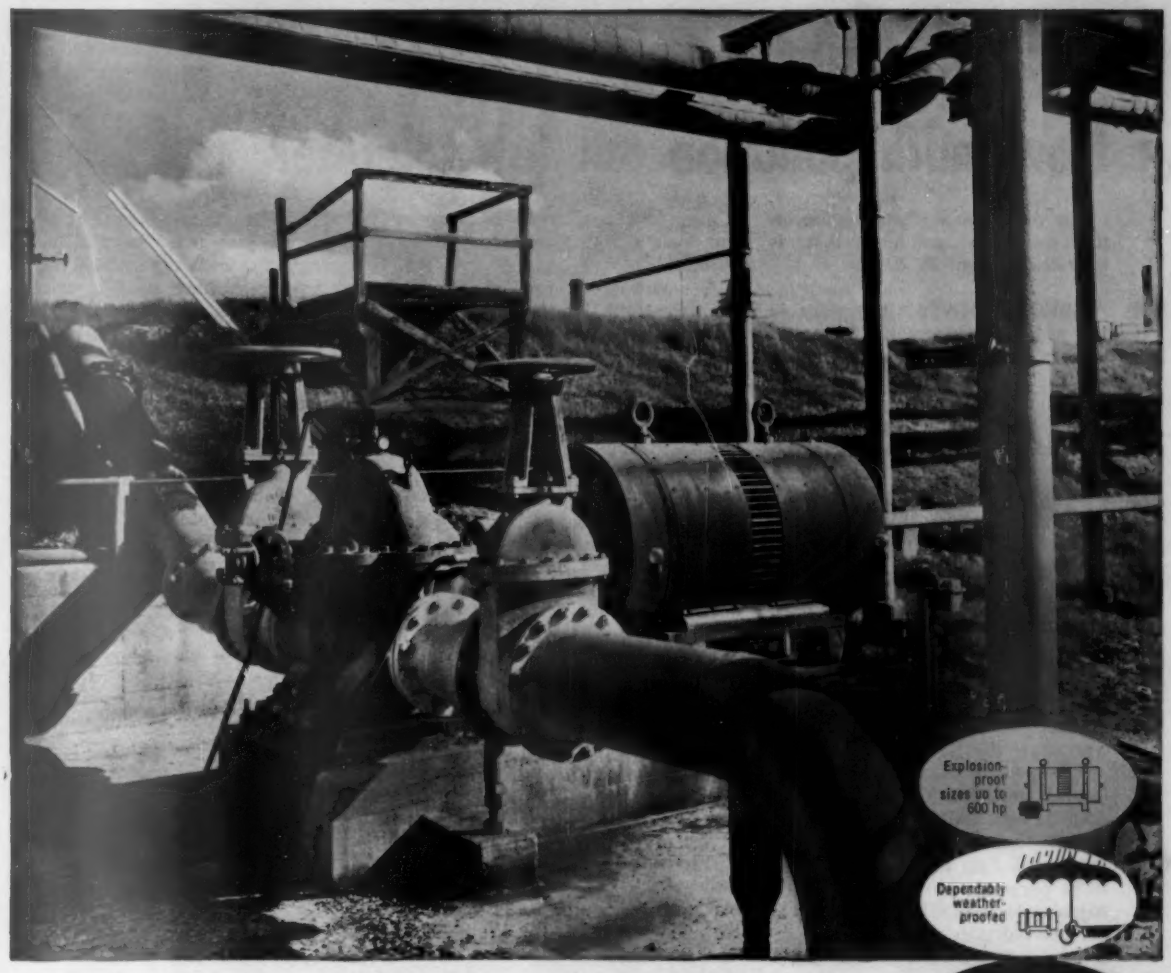
Air pollution . . . Pollution from the sulfur-plant stack has been given full consideration. An incinerator has been provided on each unit to convert any residual hydrogen sulfide to sulfur dioxide so as to eliminate any serious hazard to animal life. Since substantial amounts of sulfur dioxide must be dissipated into the atmosphere at maximum throughput, a stack of adequate height and plume characteristics had to be installed.

A stack 350 ft. high and 10 ft. i.d. at the top was installed with the sulfur units and incinerators arranged in two mirror-image pairs so that each incinerator could be reasonably connected by breeching to the stack.

An extensive field testing program has been undertaken in order to have positive knowledge of the degree of air pollution and of the effectiveness of the preventive measures taken. This program includes maintaining a weather station, analyzing capsules exposed to the atmosphere for various times at each of many stations in the area of interest, maintaining special records of plant operations, and the sampling and analysis of growing crops and other plant life.

New automatic flash tester . . .

which immediately performs the Cleveland open-cup flash test has been developed by the research department of Mobil Oil Co., Inc. The new device reduces by one-third the working time needed to perform a common test used in refineries and laboratories to assure that lubricants meet quality specifications. A license to manufacture the new flash tester has recently been awarded to Precision Scientific Co., Chicago.



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BY W. L. NELSON
Technical Editor and Petroleum Consultant

Questions on
TECHNOLOGY

How much pollution can fish tolerate?

Do you have any information on the maximum pollution that is tolerated by fish? P. Z.

A SPECIFIC ANSWER is probably impossible because of the enormous number of chemical agents, as well as oil, that can appear in refinery or industrial waste-water effluents. Harmless effluents can often be produced but in other situations no way of curing the trouble has been found. Oil in itself is probably not a major cause of trouble. The American Petroleum Institute, in its "Manual on Disposal of Refinery Wastes" (Fifth Ed., 1953) states:—"Wide divergence of opinion exists, but investigation to date fails to substantiate the fact that minute quantities of petroleum oil destroy fish or their food supply. There is, however, reason to believe that oil will affect the flavor of the fish."

Likewise, W. B. Hart, one of the leading authorities on waste disposal since at least 1938, in describing filtration tests states that "we used farm-pond fish and we put oil on them purposely to see what would happen. It didn't hurt the fish at all. The old story was that it stopped the interchange of gas—the introduction of oxygen into the water and the release of carbon dioxide which is a highly toxic material to aquatic life. Unless you covered the whole pond, you didn't interfere with the exchange." (WRPA meeting, October 21, 1949).

However, such statements do not dispose of the problem because there can certainly be enough oil in some refinery effluents to kill the life of a stream, especially if the stream is a small one. In addition to oil, numerous chemicals that are poisonous to fish can be present.

About 50 chemicals have been studied by I. E. Walhan, of Oklahoma State University (WRPA meeting, September 22, 1955, Casper, Wyo.), and safe concentrations have been determined for each of the chemicals with regard to the specie "Gambusia affinis" (mosquito fish). Likewise Clemens and Clough, of University of Oklahoma, have long studied the effect of effluents on fish (Pet. Refinere, Aug. 1953, p. 145 "Will Refinery Wastes Kill Fish?", and June 1956, p. 197, "Check Effluent with Bioassay"), and have reported numerous toxic effluents.

A somewhat standard method of test called the Doudoroff Bioassay has been widely used (Bioassay methods for the evaluation of acute toxicity of industrial wastes to fish, Sewage and Industrial Wastes 23:11:1380-1397). As far as oil is concerned, the last traces can be removed by the use of hay filters changed at 8-hour intervals (WPRA meeting, October 21, 1949, Chicago). Several refiners dry the hay and burn it.

Although many refiners are producing effluents that contain altogether insignificant amounts of oil and scarcely any toxic material (all with respect to fish), others have not been able to produce entirely satisfactory effluents, especially if the stream is a small one. Oils drained to the sewer from filling stations, and oils leaking from barges, have sometimes contributed more to oil in streams in the United States than have refineries.

Eight articles on "Waste Disposal in the Petroleum Industry" appeared in the February 1954 issue of Industrial and Engineering Chemistry, and several of these are pertinent, especially an article by Turnbull et al., page 324.

References on liquefied-gas transportation

Can you please furnish a bibliography on the storage and transportation of liquefied natural gas, ethylene, etc? D.H.R.

REFERENCES pertaining specifically to the liquefaction and transportation of natural gas or methane are shown below. The subject is basically related to refrigeration processes and insulation, and hence the general literature on refrigeration and the liquefaction of air, helium, and oxygen should also be consulted.

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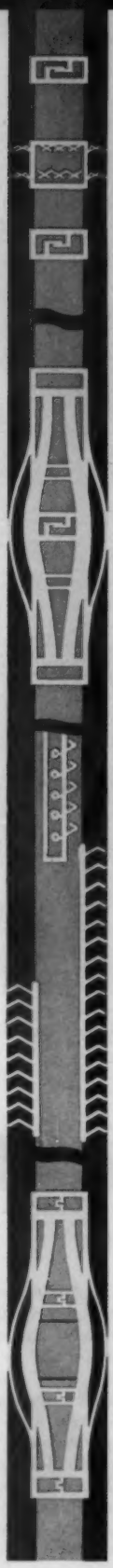

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BAKER HAMMER-LOK STOP RINGS retain scratchers and centralizers positively at the point of installation. You can avoid harmful welding on high-strength casing (such as N-80) and still maintain ample holding force with the new, easy-to-install HAMMER-LOK Stop Rings which are quickly installed while the casing is on the rack, or while hanging in the rig. By merely flattening the locking wedge with a hammer, the ring grips the casing so securely that it will resist a vertical force of as much as 35,000 pounds, according to laboratory tests. The effective initial placement of centralizers and scratchers is thus maintained.

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The Baker representative in your area is a primary cementing equipment specialist; call him in advance of your next cementing job.

Here's an analysis of interest to contractors planning to buy a new rig or equipment to upgrade one already owned. The figures are based on a study of 125 rigs, and some 28,000 days of rig operation. Cost comparisons are limited to operating-cost factors which are a direct function of the type of transmission used.

THIS 20,000-FT.-PLUS electric rig showed about 16% improvement in transportation and rigup time over that required for a nonelectric rig of the same rating.

Cost figures of 45 contractors show

ELECTRIC DRIVE for oil-well drilling rigs can reduce draw-works and transmission-system maintenance costs as much as 52%. In several specific instances savings have been higher. Down time attributable to transmission difficulties can be reduced by as much as 75%. These cost savings, and others, add up to a maintenance-cost ratio of 8 to 1 in favor of electric drive.

These significant figures were brought out in a recent study conducted by General Electric Co.'s locomotive and car equipment department. In this intensive analysis, rigs equipped

BY J. T. RAGAN
Locomotive and Car Equipment Department, General Electric Co., Erie, Pa.

with electric drive were compared with mechanical-drive rigs of equal rating and comparable age. Detailed cost figures from 45 drilling contractors were used. These include the daily costs for 125 rigs ranging in depth capacity from 4,500 ft. to over 20,000 ft. The comparisons represent approximately 28,000 days of rig operations.

Cost comparisons were deliberately limited to operating-cost factors which are a direct function of the type of transmission used—either electric or mechanical. The cost factors of maintenance, portability, reliability, and fuel consumption are those which have a direct relationship to the drive system, either through equipment operation or design of associated equipment.

Maintenance costs . . . The comparison of maintenance expenses between mechanical and electric drive includes daily costs attributable to the draw works and transmission system. In-

ELECTRIC MOTOR on trailer-mounted draw works. Compactness of electric drive made it possible to include dog house on same trailer.

ENGINE-GENERATOR POWER PLANT for a highly portable electric rig. Time spent from release of rig from one well to spudding the next is about 35% less than on mechanical rig which it replaced.

electric drive cuts rig-upkeep expense

cluded in the mechanical transmission-system figures are the chain and compound costs; in the electric-drive system, motor, generator, and control-equipment costs are included. Table 1 shows four depth classifications with the weighted average costs for mechanical rigs compared to an average of the deepest-rated electric-drive rigs.

Daily draw-works and transmission-maintenance expenses for the mechanical-drive rigs were significantly higher than like expenses for the electric-drive rig. Savings of 52% over mechanical drive were indicated.

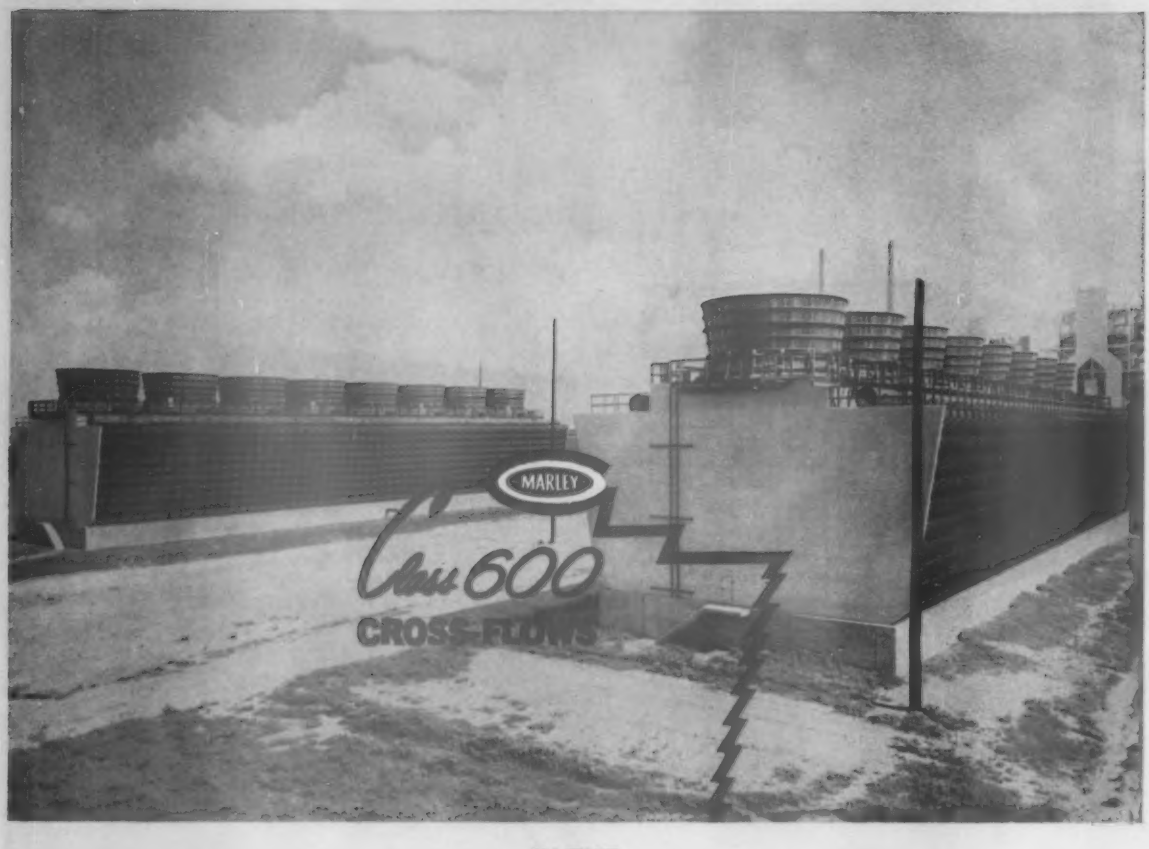
Portability costs . . . Portability expenses refer to the contractors' transportation charges, rigup and teardown costs, and were charged to the well account on a per day basis. Because these cost figures are difficult to break out of most contractors' accounting systems several rigs were studied in detail.

One, a trailer-mounted rig drilling in the depth range of 6,000 ft. in an established Colorado field, was compared with the mechanical-drive rig it replaced. Considering a number of moves, transportation and rigup time (calculated from rig release to spud in on the next hole) was reduced about 35%.

Another trailer-mounted rig of the same depth capacity showed a comparative advantage of 23%.

This improvement in portability inherent in electric rigs in the shallow-depth classification carries over to large land rigs. In a carefully recorded move, a large land rig capable of drilling below 20,000 ft. showed a 16% improvement in transportation and rigup time over that required for a nonelectric rig of the same rating.

Reliability . . . Electric-drive equip-



IN THE

100,000-GPM Bracket

When cold water requirements reach six-figure proportions, plant surveys suggest that selection of Marley Class 600 cooling towers is becoming a custom. The reason is "economic amplification" . . . as physical structure enlarges, so do Class 600's tangible and intangible advantages become progressively more important.

Consider the years that Class 600 structure adds to amortization period. Engineered for inherent durability, it has the added years-spanning protection of inert materials used at critical points throughout.

Class 600's longitudinally manifolded end-inlet distribution provides economy that increases with every foot of tower length.

Multiplied by the number of fan cells, the plus value of Marley engineered-for-the-job mechanical equipment and vibration-free fans is most imposing.

Marley's development of specialized equipment to facilitate service operations assumes realistic proportions when days (rather than hours) are conserved.

Performance? It is generally accepted as an established fact that a Marley Class 600 Cross-Flow tower will meet or exceed specified performance. Results of consecutive tests published annually emphasize the validity of this conclusion.

These are only part of an impressive list of factors that qualify Class 600 towers for highest standing in the largest capacity field. And every one is prominently present in *every* Marley Cross-Flow, whether it be a one-, four- or forty-cell tower.

THE MARLEY COMPANY MARLEY KANSAS CITY, MISSOURI

TABLE 1 — DRAW-WORKS AND TRANSMISSION-SYSTEM MAINTENANCE-COST COMPARISON

Mechanical Drive vs. Electric Drive

(Figures are weighted average daily costs)

Maintenance items	Mechanical drive 4,500 to 9,000 ft.	Mechanical drive 9,000 to 12,000 ft.	Mechanical drive 12,000 to 15,000 ft.	Electric drive over 15,000 ft.
Draw works	$16.75	$21.50	$25.60	$ 3.70
Chain and transmission	9.95	20.80	17.05	3.70
Electrical				*12.70
Total	26.70	42.30	42.65	20.10
Savings with electric drive	23%	52%	52%	

*The $12.70 cost of electric equipment maintenance includes all auxiliary electric power (i.e. lights) equipment in addition to the electric-drive system.

ment specifically designed for oil-well-drilling applications has been setting new records for reliability. One contractor operating a large land rig reported down time attributable to the drive system of only half an hour (to install a new set of carbon brushes) in the period of a year. Another contractor operating a large rig reported no down time on the last four holes —all deeper than 12,000 ft. The study revealed that a 75% reduction of down time attributable to the transmission is possible with electric drive throughout the economic life of the equipment.

Fuel savings . . . Variations in accounting methods used by contractors with regard to the fuel account make any direct comparative analysis practically impossible. The difficulty arises because fuel directly attributable to rig power cannot, in most cases, be broken out of the total fuel account. However, where this breakdown was possible and valid comparisons could be made, fuel savings of 10 to 15% were reported.

Composite analysis . . . Composite analysis of cost details for a number of rigs which were weighted to facilitate comparison indicated an over-all maintenance-cost ratio of 8 to 1 in favor of electric drive. One contractor has reported that he believes this figure to be conservative; his figures indicate that a mechanical transmission is 15 times more expensive to operate.

What do figures mean? . . . What do these percentages and ratios mean to the individual contractor and how do they apply to his particular drilling problems?

First and foremost is the fact that these results are based on actual operating figures. Since the economies of electric drive will vary depending upon a particular contractor's drilling problems, an individual analysis must be made to establish specific savings. It is logical, however, to assume that the same kind of savings are possible, in varying degrees, in all electric-drive applications.

With much of the drilling equipment now in use either overdue for replacement or in need of upgrading, the market and competitive conditions are daily increasing the need for proved equipment that offers the way out of the contractor's economic squeeze with a minimum of capital investment. Electric drive is such equipment.

Advantages . . . There are three general areas where electric drive has the advantage over other transmission systems.

The first advantage is physical. With high horsepower in a relatively small package an inherent feature of electric drive, many applications where weight and space were a problem have been sold on this advantage alone. The packaging and unitizing qualities of electric equipment, and the use of flexible cable for the transmission of power instead of chain-and-belt arrangements eliminate alignment problems and permit extreme flexibility of equipment design and layout. Because of this flexibility substantial savings can also be made in site preparation.

The second advantage of electric drive is its handling qualities. Today's electric-drive rig has been called a "modern steam rig" because of its smooth, quiet application of power. The driller has more accurate control of drilling power, enabling him better to meet various power requirements.

The third advantage is in the area of operating economies. The savings already mentioned emphasize this point.

Equipment purchase . . . At a time when money available for capital investment is extremely limited, equipment purchases must be based on future profits that will give an adequate return on investment. Electric drive has shown significant operating advantages in many cost areas. Prior to the purchase of a new rig or equipment to upgrade a present rig, a thorough economic evaluation should be made of **all** types of drilling equipment. Only in this way can a contractor assure himself that the equipment he plans to purchase will meet his particular drilling needs and provide him with a more competitive and profitable operation.

PART OF THE REASON for the fast rigup of big electric rig shows in these engine-generator packages. To rig up, they need only be set side by side and connected with flexible cables and with fuel lines to the engines.

Waste-water aeration

may be key to more efficient removal of impurities

Aeration of waste water in a closely packed tower is highly successful in removing impurities. Forced-draft air flows countercurrent to the waste matter.

BY B. V. PRATHER
DX Sunray Oil Co.

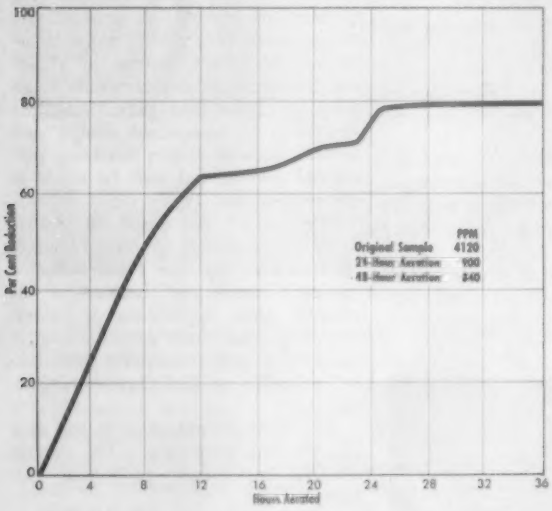
A LIMITED STUDY of the effects of aeration on the chemical characteristics of total waste-water effluent from its Tulsa refinery has been made by DX Sunray laboratories. The results of preliminary experiments were so promising that a more comprehensive program was initiated, designed to establish the most effective and economical method of aeration.

This program included studies of three types of aeration and their combinations; i.e., aeration by air diffusion through water, spraying water through air, and pumping water over cascades.

This article covers aeration by diffusion of air through water, and a combination of the three processes.

Since no two samples of waste water will be exact duplicates, the data in this paper must of necessity be taken from one specific waste-water batch. However, the samples here considered and the results obtained are typical of all experimental work done in our laboratories with these methods of aeration.

Paper presented at the WPRA meeting, Wichita, 1959.



CHEMICAL oxygen demand. Fig. 1.

Experimental procedure . . . Best results on the diffusion-of-air-through-water process, were obtained by using the following procedure: Fifty gallons of the sample studied were placed in a 55-gal. drum. Three single gallons were taken from the same batch: One for immediate analysis, and two to be corked and placed on a shelf at room temperature. One of the latter was to be analyzed after standing quiescent for 24 hours, the other to be analyzed after standing quiescent for 48 hours. Another portion of the original batch was taken for bioassay.

The contents of the 55-gal. drum were blown continuously for 48 hours with approximately 1 cu. ft. per minute of air under 5-psi. pressure, through a diffuser stone 9 in. long and ¾ in. in diameter. The air rate was adjusted so that small bubbles of air were emitted over the entire surface of the diffuser stone. Mild rolling of the water within the drum resulted.

Quart samples for chemical analysis were drawn from the drum at hourly

TABLE 1—RESULTS OF AERATION EXPERIMENTS CONDUCTED ON TOTAL WASTE-WATER SAMPLED ON AUGUST 6, 1958

		Hours Aerated											Quiescent	
	Original	1	2	3	6	9	12	15	18	21	24	48	24 hr.	48 hr.
pH	9.2	9.1	9.0	9.0	8.8	8.8	8.6	8.3	7.9	7.9	8.0	8.3	9.2	9.0
Alkalinity as pH	44	32	32	32	22	22	18	2	0	0	0	0	44	40
$CaCO_3$, p.p.m. MO.	140	136	132	128	116	116	116	102	88	82	74	68	140	138
Chloride as NaCl, p.p.m.	290										290	290	285	290
Sulfite as Na_2SO_3, p.p.m.	32	32	32	32	32	32	32	32	4	0	0	0	32	32
Hardness as $CaCO_3$, p.p.m., Total	168										168	166	168	168
Calcium	151										149	152	151	150
Sulfate as SO_4, p.p.m.	154				160	160	160	160	192	192	192	192	154	154
Phenol, p.p.m.	2.8	2.8	2.8	2.8	2.3	1.8	1.6	1.6	1.1	0.9	0.6	0	2.6	2.6
Sulfide as S, p.p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercaptans as S, p.p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammonia as N, p.p.m.	40			32	29	27	25	25	25	25	25	25	38	38
Dissolved oxygen, p.p.m.	0	0	0	0	0	0	0	0	0	1.75	3.91	6.43	0	0
Biochemical oxygen demand, p.p.m.	86.7	...	...	...	...	...	...	...	...	...	42	7.18	84.0	84.7
Chemical oxygen demand, p.p.m.	4120	...	...	3440	2540	1900	1500	1480	1400	1240	900	840	3940	3260
24 hour TL_m	16.5	...	...	...	...	...	...	...	...	...	+75	96	...	...
48 hour TL_m	15.5	...	...	...	...	...	...	...	...	...	+75	87	...	...

intervals for the first 3 hours of aeration. Thereafter, samples were drawn at 3-hr. intervals through the twenty-fourth hour, then one each at the twenty-eighth and forty-eighth hours. Special samples were drawn at the twenty-fourth and forty-eighth hours for bioassays.

Chemical analyses of the original sample, the various aerated samples, the 24 and 48-hour quiescent samples are shown in Table 1.

Although no attempt has been made to completely explain the phenomena depicted here, there are some very interesting observations to be made.

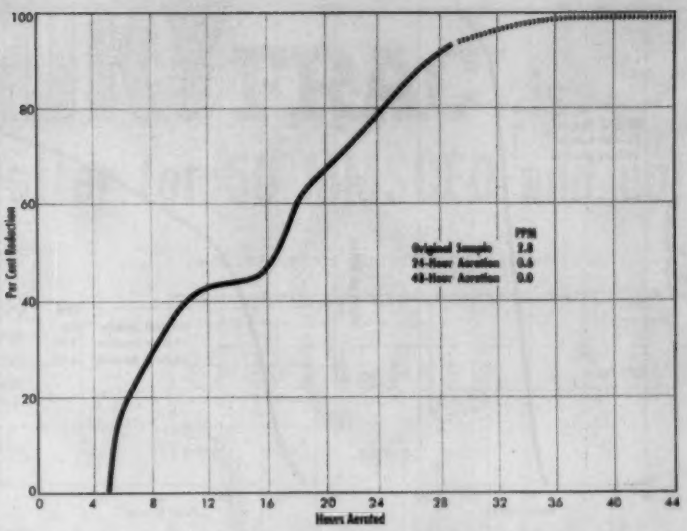
Chemical Oxygen Demand

The chemical oxygen demand (COD) (Fig. 1) shows a rapid depletion through the twelfth hour of aeration to a 63% removal, breaking to a slower removal rate with some irregularities to the twenty-fourth hour of aeration, when 78% reduction has been accomplished. The rate then slows to a snail's pace, reaching 80% removal after 48 hours of aeration.

Note that the original water shows 4,120 p.p.m. of COD, a rather high content of chemically oxidizable material for a total effluent. This figure was reduced to 900 p.p.m. after 24 hours of aeration. Other experiments also showed a rapid removal of COD when the initial concentration was high. However, reduction of COD proceeded at a much slower rate when the original concentration was low.

Also, note that the 24-hour quiescent sample as shown in Table 1, had a COD of 3,940 p.p.m. and the 48-hour quiescent sample had 3,260 p.p.m., a reduction of only 4% and 21% respectively.

No doubt much of the chemically oxidizable material was organic in nature and bacterial oxidation or decomposition could quite possibly be responsible for some of the reduction of COD, but aeration was the cause of the reduction as can be seen by a comparison of the 24-hour aerated and quiescent samples.



PHENOLS were the only organics analyzed during the investigation. Fig. 2.

Phenols . . . The only organics analyzed during the investigation were phenols. These, of course, include all cresols, etc., which are reactive to the amino antipyrine phenol test.

Removal of phenols (Fig. 2) started at sometime between the third and sixth hours and proceeded at a rapid rate to the twelfth hour. The rate then slows for 3 hours and again resumes its speed to a 93% reduction at the twenty-eighth hour. The curve between the twenty-eighth and forty-eighth hour is assumed since no samples were taken during this interval. Complete removal may have been attained in 32 hours if the rate continued the same as is shown between the sixteenth and twenty-eighth hours.

The concentration of phenols in the original sample was very small (2.8 p.p.m.). However, samples in other experiments containing as much as 10 p.p.m. phenols follow the same removal curve and all samples showed complete removal after 48 hours of aeration.

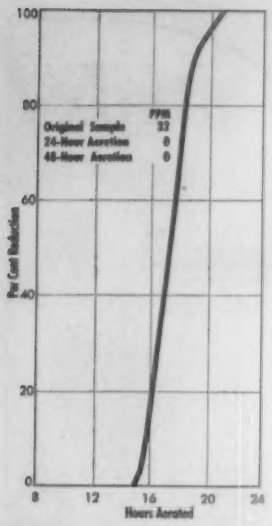
The phenol content of both the 24 and 48-hour quiescent samples indicates a reduction of only 7% from the original. Regardless of the mechanism, aeration was responsible for the removal of phenols.

Sulfites . . . All sulfurous acid salts contribute substantially to the chemical oxygen demand. Therefore, no attempt was made to differentiate among the various salts and all are reported as sulfites. This includes sulfite, acid sulfite, metabisulfite, and thiosulfates. Toxicity of these salts is due to either the acidic nature of the ionized salt or the smothering effect of dissolved oxygen depletion in the water or both. In either case, all sulfurous acid, free or combined, is highly undesirable and should be oxidized to the more stable sulfates or otherwise removed.

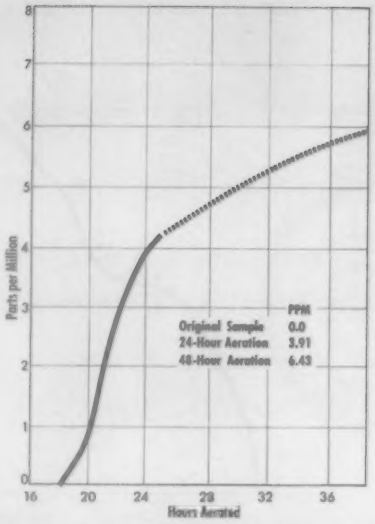
The pH of the water never dropped below 7.9 during the aeration. Since

TABLE 2—RESULTS OF AERATION EXPERIMENTS CONDUCTED ON WASTE-WATER EFFLUENT SAMPLED ON JUNE 12, 1959

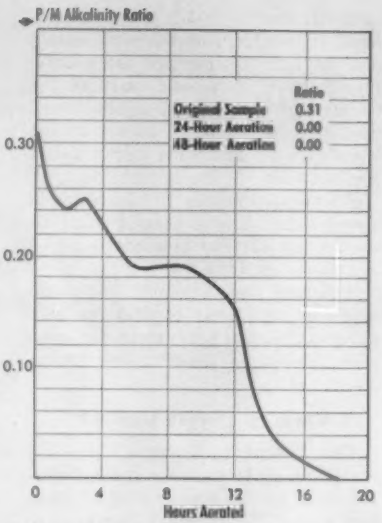
Hours circulated	Original	1	2	3	4	5	6	7	Quiescent
mins. air-water contact	...	2.2	4.4	6.6	8.8	11.0	13.2	15.4	0
pH	11.5	11.35	11.2	11.1	11.1	10.8	10.7	10.55	11.5
Alkalinity as Ph. $CaCO_3$, p.p.m. MO.	560	340	290	250	240	240	230	230	560
	780	540	480	440	430	435	440	440	780
Chloride as NaCl, p.p.m.	8	9	11	14	16	22	24	24	8
Sulfite as Na_2SO_3, p.p.m.	68	64	65	72.6	71.4	88	88	81.6	68
Hardness as $CACO_3$, p.p.m., Total	36	28	24	24	23	24	26	28	36
Calcium	35	28	23	24	23	22	24	27	35
Sulfate as SO_4, p.p.m.	21	160	270	420	570	840	960	980	21
Phenol, p.p.m.	7.9	7.4	7.3	7.2	6.2	5.4	4.3	2.0	7.9
Sulfide as S, p.p.m.	96	65	54	45.5	31	24	14.5	11.0	96
Mercaptans as S. p.p.m.	0								
Ammonia as N, p.p.m.	101	53	32	23	16	9	9	6	100
Dissolved oxygen, p.p.m.	0	0	0	0	0	0	0	0	0
Chemical oxygen demand, p.p.m.	630	468	450	440	391	416	397	378	630



SULFITES showed no removal until after the fifteenth hour of aeration. Fig. 3.



DISSOLVED OXYGEN was absent until shortly after the eighteenth hour of aeration. Fig. 4.



STABILIZATION of water is substantiated by the phenolphthalein to methyl orange (pm) ratio to the alkalinity. Fig. 5.

evolution of SO_2 is hardly conceivable at this pH level, it is assumed that all sulfites were oxidized. This assumption is substantiated by the increase in sulfates as shown in Table 1.

Oxidation of the various oxidizable components of the waste water appears to be selective. That is, phenols begin to undergo oxidation early in the process and continue at a fairly constant rate. However, sulfites (Fig. 3) showed no removal until after the fifteenth hour of aeration. By the eighteenth hour, 88% removal had been accomplished and complete removal was shown by the twenty-first hour. Sulfates increased accordingly.

Such selectivity is indicated in all runs made with this type aeration. The 24 and 48-hour quiescent samples showed no depletion of sulfites. Again aeration must have been responsible for the removal of sulfites.

Stabilization . . . At the eighteenth hour of aeration 66% of the COD, 88% of the sulfites, and 61% of the phenols had been removed. Dissolved oxygen (DO) (Fig. 4) was absent. However, at the twenty-first hour the water had a content of 1.75 p.p.m. of DO which increased to 3.91 p.p.m. by the twenty-fourth hour, and continued to climb to 6.43 p.p.m. at the end of 48 hours of aeration. Neither of the quiescent samples contained any DO when analyzed.

These data indicate that the waste water was approaching stabilization at the eighteenth hour and that further removal of the original oxidizable constituents would proceed at a much slower rate thereafter. Stabilization of the water is substantiated by the phenolphthalein to methyl orange (pm) ratio of the alkalinity (Fig. 5.)

The ratio of the original sample was 0.31 and remained at this decimal in both the quiescent samples. The first hour of aeration showed a sharp dip in the ratio to 0.24. The ratio continued at this figure for a short time then dipped again to 0.19 at the sixth hour, remained the same through the ninth hour then proceeded downward again to 0.16 at the twelfth hour, to 0.02 at the fifteenth hour, and to zero at the eighteenth hour.

At this point 37% of the total alkalinity was removed and 47% removal was shown at the twenty-fourth hour, to 0.02 at the fifteenth hour, and the quiescent samples.

It is conceivable that carbon dioxide in the air was responsible for much of the change of the pm ratio, but the reduction of total alkalinity must have been due to oxidation.

Changes in pH . . . These changes during aeration (Fig. 6) further substantiate the stabilization theory. Beginning at 9.2 on the original sample, the pH is gradually lowered to a low of 7.9 at the eighteenth hour, increasing to 8.2 at the twenty-fourth hour and to 8.3 at the forty-eighth hour. The pH of the quiescent samples remained essentially the same as the original water.

pH cannot be correlated with the quantity of alkalinity present but it is directly correlated to the pm ratio. Since stabilization is related to this ratio, pH may be used as part of the control of the treatment by aeration. The dip in the pH curve between the fifteenth and twenty-fourth hours coincides with the complete removal of sulfites and the leveling off of the COD curve.

Attention is directed to the first part of the pH curve. Note that the pH drops slowly to 8.8 at the end of 6 hours' aeration. This has a definite relationship to ammonia removal (Fig. 7.).

The ammonia curve shows 20% removal in the first hour, tapers off to

TABLE 3—REMOVAL OF AMMONIA BY AERATION AT VARIOUS pH LEVELS

Hours circulated	Ammonia, p.p.m. N							% Reduc.
	Original	1	2	3	4	5	6	7	
mins. air-water contact		2.2	4.4	6.6	8.8	11.0	13.2	15.4	
pH 9.95	101	47	20	9	5	3.5	2	1.5	98.5
9.5	114	52	21	10	6	4	3	1.6	98.6
9.0	118	57	36	20	11	8	6	4	96.6
8.9	110	65	45	30	22	16	12	10	90.9
8.8	105	85	72	62	55	50	46	44	58.0
8.5	100	90	83	76	70	65	61	58	42.0
8.3	103	100	98	97	96	95	95	94	8.7
8.1	109	108	107	107	106	105	104	104	4.6

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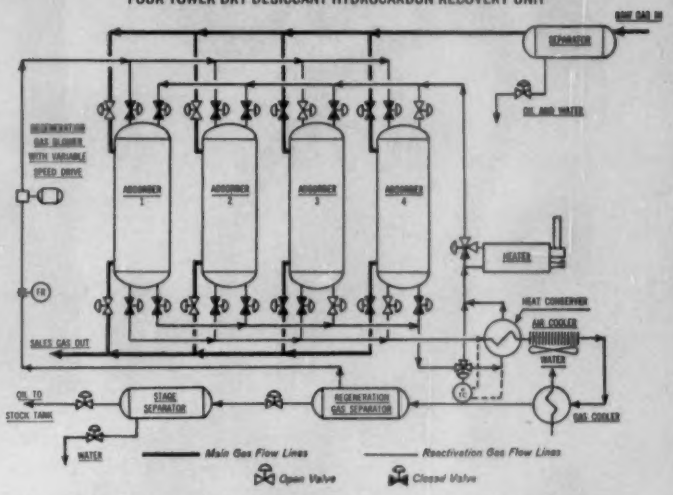

Flow diagram of a typical 4 Tower DRY FRAC Unit With Closed Cycle Regeneration. Smaller diameter towers and smaller valves of standard sizes contribute to reduction in cost of this type unit.

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On this pumping unit, the 15-hp Life-Line "A" motor operates in an atmosphere of damaging dust, sand and moisture. Despite continuous, heavy-duty service, motor has never suffered any overheating since first installed. Prelubricated bearings of the Life-Line "A" eliminate periodic greasing . . . keep lubricant in . . . dirt out.

28% at the second hour, 32% at the third hour and finally reaches a maximum removal of 38% at the sixth hour of aeration. No further removal was obtained, indicating that the ammonia was removed by stripping rather than by oxidation. These data also suggest a minimum pH for ammonia removal by stripping. This ammonia removal curve has been characteristic of all runs made by this method of aeration on our particular waste water.

Ammonia is most toxic to fish when it exists as the molecule[5] and the danger of high levels of ammonium salts lies in the inability of a receiving stream to buffer alkaline wastes to a pH below 8.3. Total ammonia, therefore, becomes a problem with this type of aeration only when its removal must be nearly 100% because the receiving stream is unable to properly buffer the alkaline wastes which may come from a variety of industrial sources.

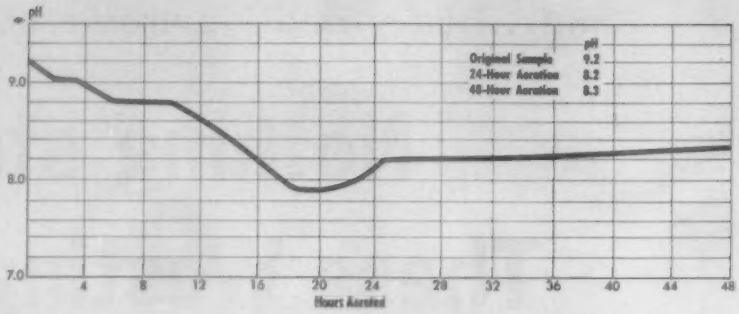
The Arkansas River flowing by the DX Sunray refinery at Tulsa appears to be sufficiently capable of this buffering action at the present time. This is demonstrated by bioassays which were run on these waste samples.

Bioassays . . . Bioassays were conducted by personnel of Oklahoma State University Research Foundation under the direction of Dr. Troy Dorris, principal investigator, in cooperation and under contract with the Oklahoma Oil Refiners Waste Control Council. A mobile laboratory was set up on refinery grounds in which the bioassays were run, thus eliminating any possible interference with dependable results due to time lags.

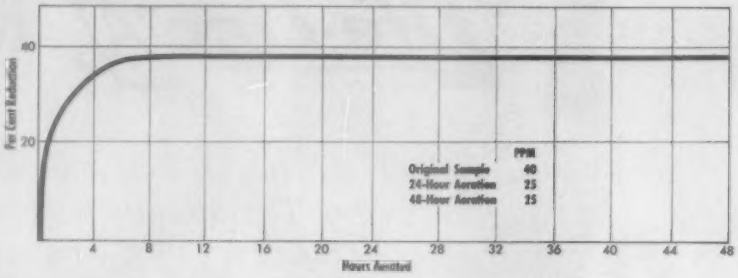
Bioassays were run on the original waste water, the 24-hour aerated waste water, and the 48-hour aerated waste water. The 24-hour and 48-hour TL_m (median tolerance limits) of the original waste water are recorded at 16.5 and 15.5 respectively.

Having had no experience with this type of waste-water treatment, assays on the 24-hour aerated sample were set up to a 75% maximum concentration of the waste water in dilution water. Hence the 24 and 48-hour TL_m for this sample for both recorded as 75+. The 24 and 48-hour TL_m recorded for the 48-hour aerated sample are 96 and 78 respectively.

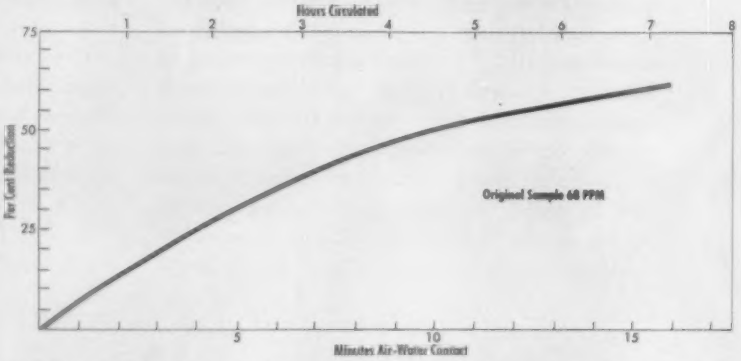
Biochemical oxygen demand . . . Biochemical oxygen demand (BOD) was run on the original waste water, the 24-hour aerated sample, and the 48-hour aerated sample. Results obtained showed the BOD of the original water as 86.7 p.p.m., the 24-hour aerated sample as 42 p.p.m., and the forty-eight-hour aerated sample as 7.18 p.p.m. The per cent reduction was 52 in 24 hours and 92 in 48 hours.



BEGINNING at 9.2, pH gradually lowered until the eighteenth hour, then increased to twenty-fourth hour, when it leveled out almost completely. Fig. 6.



AMMONIA REMOVAL begins immediately and lasts for 6 hours, when it levels off. Fig. 7.



AIR-WATER CONTACT resulted in sulfite reduction beginning almost immediately and continuing steadily through the 7 hours of operation. Fig. 8.

Chemical analyses of this particular waste-water sample showed the absence of sulfides and mercaptans. Consequently there are no data to indicate a successful removal of these chemicals. However, some samples run during this phase of our investigation did contain both sulfides and mercaptans. In each case where these chemicals were present analysis indicated a complete removal of both was accomplished in the first 3 hours of aeration, and always at a pH high enough to preclude any hydrogen sulfide.

The assumption that sulfides were oxidized was substantiated by an increase in either sulfites or sulfates during the time of sulfide removal. Moreover, there was never any sulfite removal as long as sulfides were still present.

Aerating Methods

Spraying waste water through air and pumping over simple cascades produced poor results; consequently, our attention turned to various combinations of the three types of aeration. One of these combinations which included all three types proved highly successful.

Using a closely packed aeration tower with forced-draft air flow countercurrent to the waste water, many

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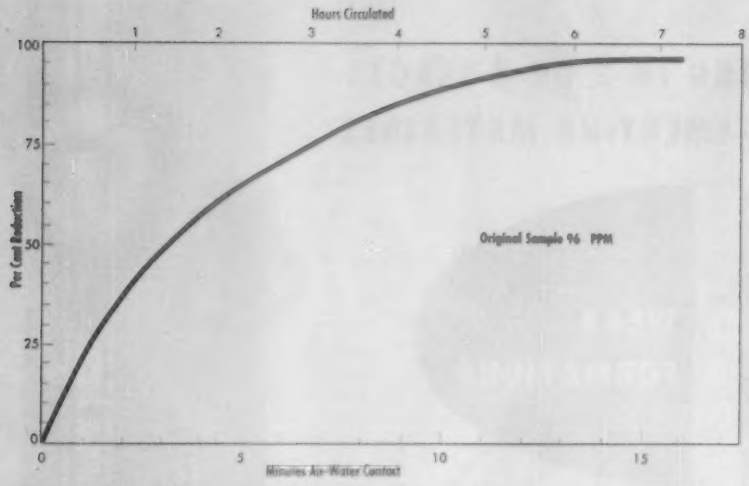
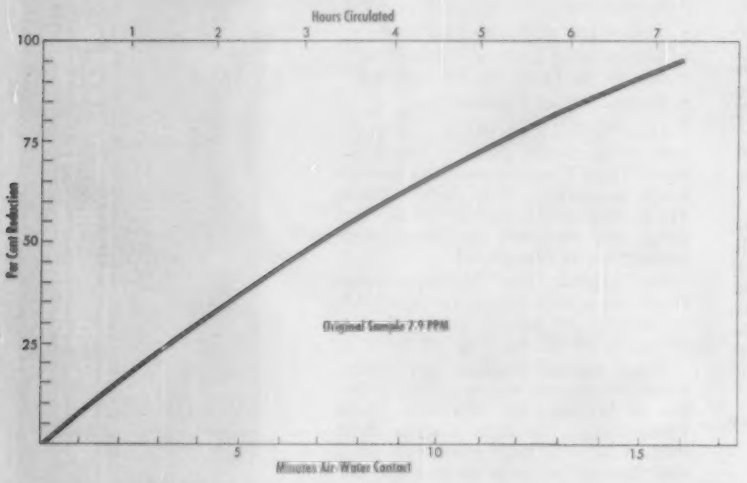


SULFIDE REDUCTION from air-water contact resulted in removal of 40% of the sulfides during the first hour of circulation. Fig. 9.



PHENOL REDUCTION was consistent throughout air-water contact operations, and had the operation lasted another hour, would probably have been totally removed. Fig. 10.

batch runs were made at various gas-liquid ratios. Several of these runs produced rather spectacular results. The run reported here is typical of these successful operations.

Operational data for this particular batch run are as follows:

Volume of batch	55	gal.
Rate of flow over tower	2.6	g.p.m.
Holdup time in tower	1	minute
Gas-liquid ratio (cubic feet of air per gallon of water)	480.1	
Air-water contact time per hr. circulation	2.2	min.
Hours circulated	7.3	

Two samples of the original water were drawn as in other experimental runs. One for immediate analysis and a second to be corked and to stand quiescent for the duration of the test run.

Analysis of the second sample was made at the end of the quiescent period, and compared with that of the immediate analysis of the batch water to determine any change in the chemical characteristics of the water on standing. Samples were drawn from the tower basin each hour for analysis, during operations.

Table 2 shows the chemical analyses of the original sample, the 7-hour quiescent sample, and the hourly samples drawn from the tower basin.

Using chloride content to determine concentrations of the waste water due to evaporation, the per cent reduction of various components during operations was calculated and plotted against time of circulation and of air-water contact.

Air-water contact . . . The air-water contact time was calculated from the number of cycles of the batch over the tower per hour of circulation and the holdup time of the aeration tower. That is, the time required for water

TABLE 4—RESULTS OF AERATION EXPERIMENTS CONDUCTED ON WASTE-WATER EFFLUENT, JUNE 8, 1959.

Hours circulated	Original	1	2	3	4	5	6	7	Quiescent
Mins. air-water content		2.2	4.4	6.6	8.8	11.0	13.2	15.4	0
pH	9.9	10.0	10.0	9.95	9.9	9.8	9.75	9.7	9.9
Alykalinity as Ph.	96	86	82	78	72	68	68	64	96
$CaCO_3$, p.p.m. MO.	332	262	240	228	228	224	226	226	332
Chloride as NaCl, p.p.m.	148	158	162	164	164	166	168	170	148
Sulfite as Na_2SO_3, p.p.m.	66.4	82.1	137.5	132.7	131	129.6	129.6	107.4	66.4
Hardness as $CACO_3$, p.p.m., Total	80	75	75	75	75	76	77	79	80
Calcium	68	63	63	63	64	65	65	67	68
Sulfite as SO_4, p.p.m.	118	260	400	400	400	410	410	430	115
Phenol, p.p.m.	3.6	3.3	3.14	3.07	3.0	2.9	2.64	2.57	3.4
Sulfide as S, p.p.m.	89.6	48	3.2	Trace	Trace	0	0	0	108.8
Mercaptans as S, p.p.m.	0								0
Ammonia as N, p.p.m.	9.6	1.0	0.7	0.4	0.3	0.25	0.25	0.25	9.1
Total oil, p.p.m.	98							54	98
Dissolved oxygen, p.p.m.	0	0	0	0	0	0	0	0	0
Chemical oxygen demand, p.p.m.	740	604	488	416	440	512	544	568	740
TL_m 48 by OSU	28.5							GT100*	28.5

*Greater than 100

to traverse the tower from top to bottom. In this case, the contact time was 2.2 minutes per hour of circulation. The total air-water contact time for the full 7.3 hours of circulation was 16 minutes. No dissolved oxygen was detected at any time in the water contained in the tower basin.

The absence of dissolved oxygen in the tower basin water was common to most experimental runs in this series. The basin water was sampled at 30-minute intervals for DO during the runs in order to determine when and where oxidation of the chemicals occurred. Results indicated immediate use of the oxygen within the tower as it was dissolved in the water. If this is true, then 15 to 20 minutes of contact time is all that would be required to obtain such results as are reported here, and no additional standing time is necessary.

Sulfites . . . Sulfite reduction (Fig. 8) began immediately and continued at a rather steady rate throughout the 7 hours of operations. This occurred regardless of the presence of sulfides and the absence of dissolved oxygen in the tower basin water.

Several theories could be propounded to explain the difference in sulfite reduction rates of the two processes. The pH of the water at the beginning of the run was 11.5, and it never dropped below 10.5 during the entire operation, which may have had some effect on the reduction rate. The pm ratio of the original water was .72 and never dropped below .52 indicating exhaustion of all carbon dioxide in neutralization of the hydroxide alkalinity present.

This in turn may account for the loss of calcium during the run. Interfacial surface renewal between gas and liquid during aeration may have been more rapid here than in the other process, thus hastening reaction between sulfite and oxygen in each small droplet of water in the aeration tower.

Sulfides . . . Forty per cent of the sulfides present were removed in the first hour of circulation (Fig. 9). The reduction rate then slackened gradually to the fifth hour, when it became rather slow for the remainder of the test. Complete removal was not accomplished in the 7 hours of circulation but the reduction was a high 96%.

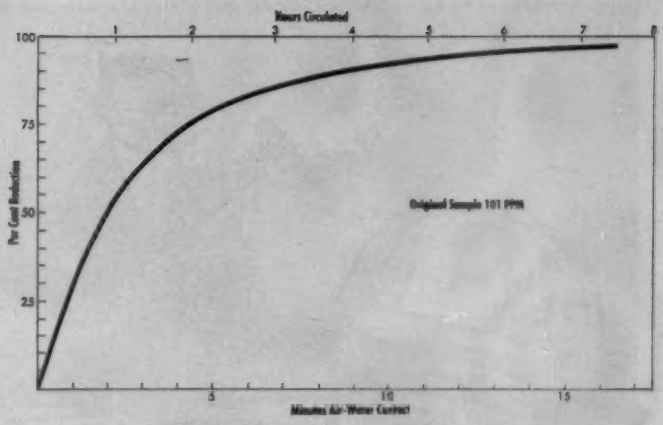
The question of what happened to the sulfides naturally arises. At the pH existing during operations, emanation of hydrogen sulfide would scarcely be considered. The tower, the tower basin, and the water were examined for free sulfur. None was found. Sulfide must have been oxidized first perhaps to the various sulfites, then to sulfate. If such is the case, then the loss of both sulfides and sulfites should be reflected in sulfate gain.

Examination of the analytical data confirms this theory. Moreover, no odor of hydrogen sulfide was detected in the exhaust air during the circulation period and lead acetate paper gave no reaction when wetted and placed in the exhaust air stream. How else could the tremendous increase in sulfate concentration be explained?

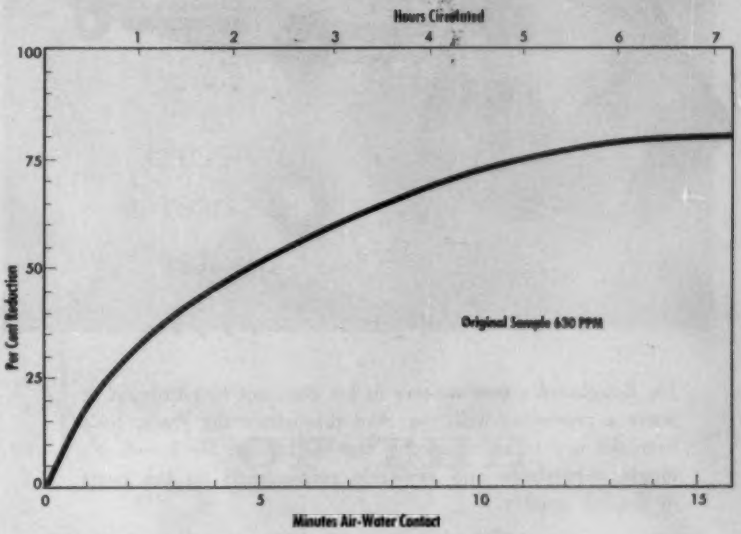
Phenols . . . Phenol reduction (Fig. 10) was consistent throughout the operation. A steady, continuous removal culminated in a 91.5% reduction in the 7 hours of circulation. If this rate of reduction should continue, another hour of circulation would have produced total removal.

No analytical work was done to establish the route of phenol exit. It is presumed they were subjected to auto-oxidation and converted to other compounds which do not react to the phenol tests. Future work may enable us to follow their pathway to final stabilization.

It is noteworthy that the phenol concentration of the original water of this run was about three times the quantity in the water used in the experimental run reported in the first part of this paper. Other runs have been made using this method of aeration, on waters with phenol concentrations as high as 43 p.p.m. In each such case the reduction rate was steady and continuous and 95 to 98%



HIGH AMMONIA REDUCTION confirms relationship between pH and ammonia removal. Fig. 11.



REDUCTION RATE for chemical oxygen demand during air-water contact was rapid for the first hour and a half, then slowed until fifth hour, when COD reduction all but stopped. Fig. 12.

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reduction was accomplished in 7 to 9 hours of circulation.

Ammonia . . . The 98% reduction shown (Fig. 11) confirms the earlier indicated relationship between pH and ammonia removal.

Special test runs using tap water, fortified with ammonia and buffered to various hydrogen ion concentrations, show that the reduction rate is reasonably constant at any pH level above 9.0 (Table 3). As the pH is lowered to 8.9, there is a definite slackening of the rate and at 8.8, it is slowed to 50% of the rate at the higher pH levels. Thereafter, the rate continues to slow until it approaches less than 1% per hour removal at pH 8.1.

During these runs, chemical analyses were made on the water for nitrate and nitrite nitrogen. All analyses were negative. This is in agreement with the theory that ammonia may be stripped from solution by aeration provided the water is buffered to the proper minimum pH level, but no oxidation occurs at normal temperature.

Chemical oxygen demand . . . The reduction rate for chemical oxygen demand (Fig. 12) was rapid for the first hour and a half of circulation. It then decreased slightly, remaining at this slower rate until the fifth hour after which there was very little reduction.

In this run, as in many others, the COD reduction-rate curve may be used as a stabilization index. It is reasonable to assume that oxidizable chemicals in the waste-water approach completion of oxidation reaction as the COD approaches zero. It should be understood that this reasoning excludes bacteriological decomposition of waste chemicals in the water.

Bioassays . . . No bioassays were made on this experimental run. However, one of the several runs made by the aeration-tower method is of particular interest from the standpoint of toxicity to fish.

Samples of the water from this batch, before and after aeration, were sent to Oklahoma State University for bioassay. Table 4 shows our chemical analyses of both samples and the bioassay results. Although this run left much to be desired in per cent reduction of some chemicals and stabilization of the waste water, the bioassay results were indeed heartening.

The reduction of toxicity from 48-hour TL_m of 28 to greater than 100 indicates that the toxic chemicals in the original waste water had been

oxidized to a nontoxic state or otherwise removed from solution. Aeration again proved its worth as before.

Aeration times . . . In comparing the two aeration methods, it is clear that the actual aeration time required to produce desired results by the diffusion of air through water is a matter of hours as opposed to a few minutes air-water contact time required by the aeration-tower method. It should be further noted that complete circulation time required by the latter method is about one-third to one-half the time required for aeration by the former.

In view of these results, our investigations are proceeding with the aeration-tower method.

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BOOKS

THE OIL DEPLETION ISSUE, by John H. Lichtblau and Dillard P. Spriggs. Petroleum Industry Research Foundation, Inc. 122 E. Forty-second Street, New York 17. 148 pp. $2.60.

Here petroleum marketers are defending the percentage-depletion tax treatment of oil producers, calling it essential for the maintenance of existing price levels for gasoline and other oil products.

Empire State Petroleum Association, which has an affiliation with Petroleum Industry Research Foundation, is undertaking national distribution of this book by two economists.

In layman's language the book explains what percentage depletion is, why it has become a political issue, how it operates, and how it affects the industry's operations and the supply and price of petroleum products.

Without this tax feature, the authors conclude, exploration for oil would be uneconomical at today's costs and prices. Hence the elimination or substantial reduction of the current percentage-depletion rate would necessitate an increase in the price which consumers pay for their oil products.

The study points out that the depletion-allowance rate of 27.5% was calculated to reflect the true replacement value of oil

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in the ground. In recent years, however, it has usually represented less than this value and in the future it will probably cover a steadily declining share of the cost of crude-oil reserves.

The study devotes an entire section to the frequently debated question of whether percentage depletion should be maintained for production of oil abroad by American companies. It concludes that this would be discriminatory, contrary to U. S. policy, and a hardship to American companies, without increasing U. S. tax revenues.

ANALYSIS CHARTS FOR THE DETERMINATION OF TRUE RESISTIVITY FROM ELECTRIC LOGS, by Hubert Guyod and John A. Pranglin. Published by Hubert Guyod, P. O. Box 282, Bellaire, Tex. $22.50. 202 pp.

This book presents a method for determining resistivities from an electric log comprised of the 16-in. and 64-in. normals and the 18-ft. 8-in. laterals. The book contains over 250 charts that permit the determination of R_t and in many cases, R_t and D_i for single beds from 2 to 50 ft. thick and for ranges of resistivities (R_t, R_i, R_o, and R_m), hole sizes, and invasion diameters. Instructions are given for the application of the data to certain nonuniform formations. A discussion of the resolving power of resistivity curves and of the effects of inaccuracies in the various pertinent factors (R_s, R_m, R_o, e, d) is included.

RESISTIVITY DETERMINATIONS FROM ELECTRIC LOGS. Published by Hubert Guyod, P. O. Box 282, Bellaire, Tex. $20.

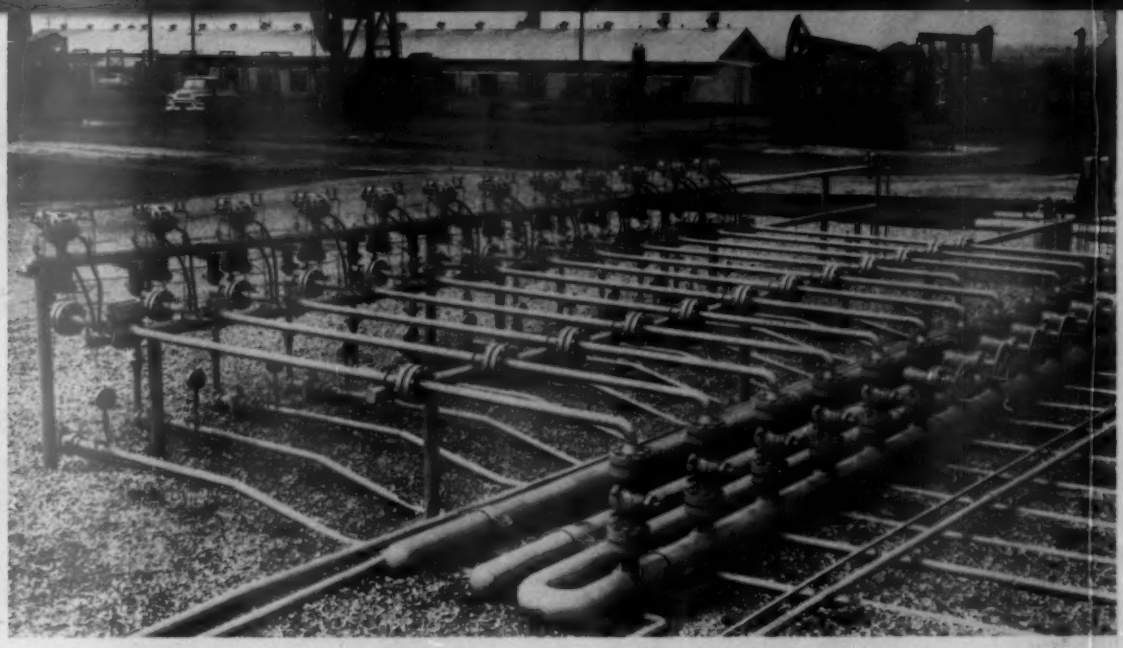
This book was prepared in 1957 as a field manual for six major oil companies. It has now been released for sale to the public.

It gives the background necessary for the practical use of resistivity curves, and fundamental data for determining the resistivity of single beds and of multiple-layer formations. Typical logs are given for single beds (invaded and noninvaded), multiple beds, and sandwich-type formations. Used in conjunction with the Analysis Charts book by Guyod and Pranglin, all the analysis data necessary for the determination of resistivities from an electric log are available.

ELECTRIC ANALOGUE FOR RESISTIVITY LOGGING. Published by Hubert Guyod, P. O. Box 282, Bellaire, Tex. $50. 117 pp.

This book was prepared in 1958 for six major oil companies as a report summarizing some of the work done with the analogue computer. It has now been released for sale to the public. The book is in two parts. The first describes the analogue and its operation. The second is an investigation of the response of normal and lateral resistivity curves on single and multiple beds. It discusses the apparent resistivities, shapes and curves, methods of analysis, and other topics for normal spacings from 0.75d to 15d and for lateral spacings from 4d to 36d. The book is particularly useful in research departments, universities and log analysts' libraries.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.



BUILT-IN PROPORTIONING FEATURES of this manifold assure that injection rates to all wells will be kept in proper ratio, regardless of the volume discharged by the injection pumps.

Automatic manifold controls water injection

. . . at Union Oil water flood in California

BY D. H. STORMONT
District Editor

A UNIQUE SYSTEM for regulating the amount of water going to individual injection wells is being used by Union Oil Co. of California at a water flood in Dominguez field near Los Angeles.

Controls automatically ration the amount of water going to each of 12 injectors in proportion to the total volume available. Each receives a preset volume as long as the injection pumps supply the required total volume. Should they deliver less than this, injection rates of all wells automatically take the same percentage decline.

Main advantage of the automatic manifold is the assurance that wells with high injection pressures will not be starved if the supply of water falls off for some reason or other. Another is the elimination of orifice charts for individual wells. Only the total amount of water delivered to the manifold is recorded.

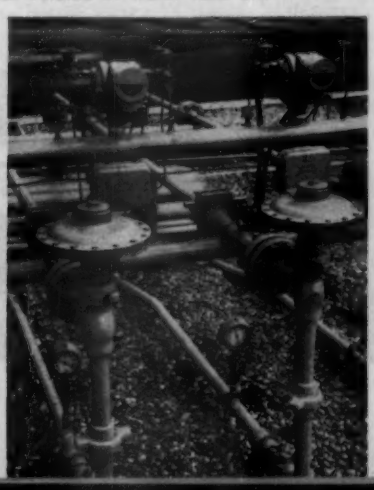
Basis for design of manifold . . . In carrying out a pattern flood it is desirable that each injection in a five-spot receive the amount of water which will result in the oil being driven uniformly toward the central producer. The amount going daily into each injector is secondary to individual inputs being kept in proper ratio.

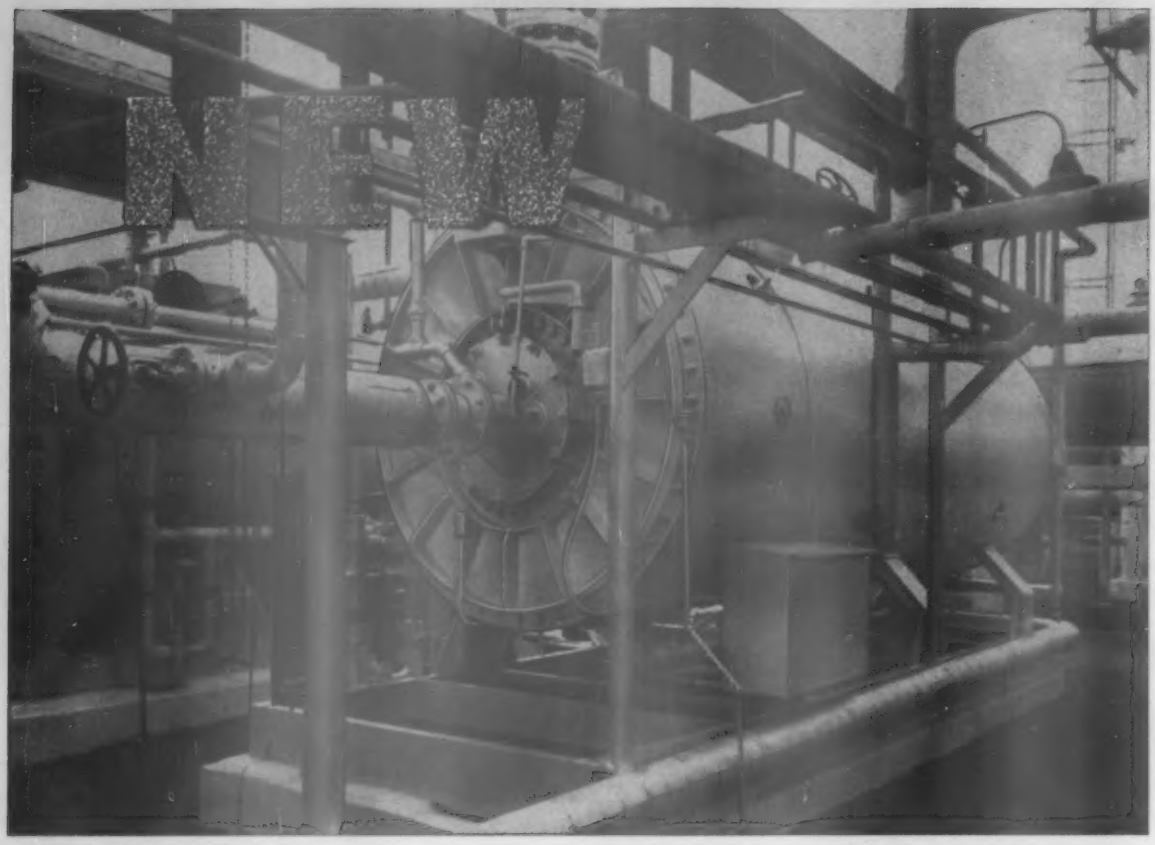
Union's automatic manifold was designed with this viewpoint in mind. It assures that each well receive its proportionate share of the total water injected. Although no record is made of the amount of water injected into each well daily, the volume is easily and accurately calculated from the master recorder and integrator.

The manifold serves injectors to both the first and second zones on Union's Hellman lease in the East Central fault block. The first zone flood, started in July 1954, has proved highly successful. (OGJ, Sept. 22, 1958, p. 77). Flooding of the second zone has been under way for only about 6 months, but is expected to be equally successful. Both are irregular five-spot floods.

The over-all East Central project

THE DIFFERENTIAL pressure indicating transmitters (left) of these "slave" wells are connected to a common supply of 20-psi. air, as are the receiver controllers (right). This interlock causes the same percentage decline to occur in the injection rates of all wells whenever the total volume of water falls off.





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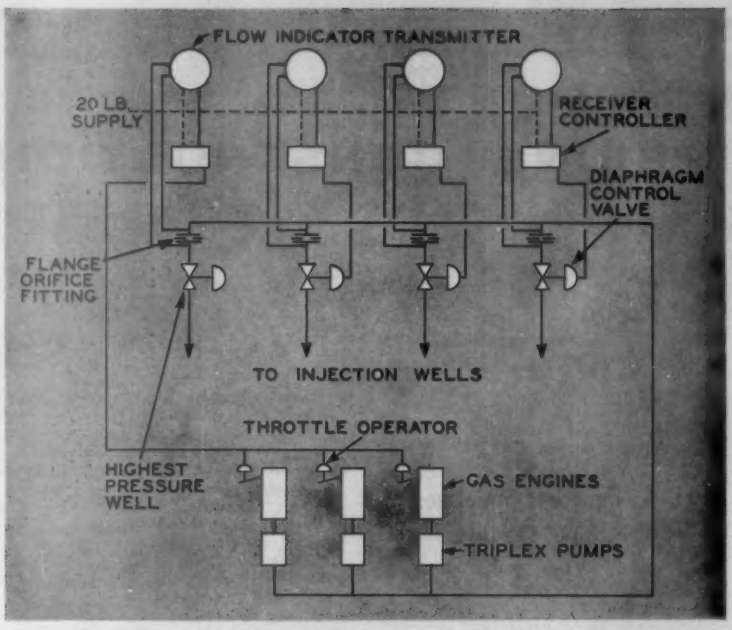
- **Simple, Low-Cost Installation**
- **Long, Maintenance-Free Life**
- **Higher Sulfur Recovery Yields**
- **Simplified Control**

The new AMES packaged sulfur recovery furnace is specifically designed for sour gas sulfur recovery operations. It is well adapted to refinery tail gas or sour gas production field "off gas" recovery. Its outstanding efficiency and economy have been proven in use. Through a unique control arrangement, a constant temperature feed stream to the catalytic converter is assured, resulting in high yields throughout wide variations in feed gas rates and composition.

The AMES unit shown here has been giving virtually maintenance-free service for over two years. This Anlin Co. installation is in conjunction with the California Oil Co. refinery at Perth Amboy, N. J. It is rated at 35 tons per day and produces extremely pure sulfur at yields well in excess of 95% at a wide range of thruput and feed composition.

Delivered as a complete package, the AMES furnace saves installation time and costs. The AMES boiler-burner unit combines the conventional dutch oven and separate waste heat boiler into one compact, automatic unit. Hence, first cost as well as operating costs are greatly reduced. Since no extensive foundations or housings are required, it provides a very flexible installation. The units are available in a wide range of sizes to suit your process needs.

Whatever the scope of your sulfur recovery operations, it will pay you to investigate the new AMES units. For complete facts on this phase in sulfur recovery, contact your nearby AMES dealer, or write direct to:



SCHEMATIC FLOW DIAGRAM of the automatic manifold Union Oil Co. has designed for controlling water injections at a Dominguez flood.

is a cooperative endeavor of Union and Shell Oil Co. Injection wells along the common boundary prevent migration of oil from one property to another. Each company supplies its own water and independently conducts flooding of its leases. A field engineering committee sets the amount of water going to each zone on each property.

Five high-pressure triplex pumps, driven by gas engines, supply treated and filtered water to Union's floods. A total of about 10,000 bbl. daily is being injected, but only some 6,000 bbl. of this is through the 12 wells connected to the automatic manifold.

How manifold operates . . . As an accompanying photo shows, headers are available for distributing water at three different pressures. Only one header, receiving water at the discharge pressure of the triplex pumps, is being used at this time.

Flow of water from the header to the individual injection wells is through a meter run and a single control valve. Positive shutoff of the individual injectors is provided by a valve ahead of the meter run. No other valves or controls are used in most injection lines.

Equipment used in each injection line consists of a Daniel orifice fitting, Barton differential-pressure-indicating transmitter, Fisher receiver controller, and the diaphragm-operated control valve. One side of each indicating transmitter and controller is connected to a common supply of 20-psi. air, as shown in the accompanying simplified flow chart.

The 2½-in. line supplying air to these instruments also serves as a support for them. Independently supported in this manner, they are not affected by pulsations or vibrations in the meter runs and injection lines.

Desired injection rate for individual wells ranges from as low as 200 bbl. daily to a high of about 1,000 bbl. The difference in rates is provided for in the size of the orifice. Standard plates are used. They are sized to the nearest ⅛ in. so that the pressure drop across the orifice is about the same for all wells. Indicators on all controllers thus are positioned about the same, even though the flow to one well is several times that to another.

Automatic control is achieved in the following manner: The well with the highest surface injection pressure is designated as the master control well. The well currently serving in this capacity requires a pressure of about 1,000 psi.

The receiver controller for this well is connected to the throttle operators on the engines, instead of to the control valve as is done with the "slave" wells. Since the control valve of the master well is normally open, the triplex pumps therefore automatically run at a speed which will put the recommended amount of water (currently 770 bbl. daily) into this well. Pressure control is not required as the pumps' discharge pressure can go no higher than the injection pressure of the master well.

Controlling the rate to the slave wells in the system is accomplished by setting the desired rate on the receiver controller. This acts to keep the control valve at the position which will result in the desired amount of water being injected.

In the event an engine dies, the master well will tend to drop in rate. However, the receiver controller will function to speed up the remaining engines until they are running wide open.

Normally, in this event, wells with an injection pressure less than that being developed by the pumps would continue to take their normal quantity of water. Wells needing more pressure would decline in rate.

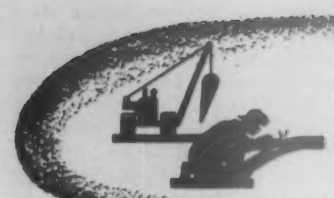
This is not the case at the Dominguez manifold. Since all receiver controllers are interlocked through the common air-supply line, all will act to cause the same percentage decline in the injection rates to all wells. Specifically this means that if the total water injected drops by 10%, a 1,000-bbl. well would drop to 900 bbl. and a 200-bbl. well would drop to 180 bbl.

Effect of plugging . . . As is the case in any water flood, injection pressures increase with time due to fillup and plugging. In the case of excessive plugging in some well, its injection rate would not be affected as long as the pressure is below that of the master well. If it builds up higher than that of the key well, and for some reason or other this fact is overlooked, its injection rate (and the total volume also) would fall off. Such is not likely to happen. But even if it did, the volume of water involved would be relatively unimportant.

Should a well suddenly stop taking water, due to collapse of the surface injection line or some other cause which prevents the water from reaching the well, the total injection rate would again decline.

A manual override is provided in the event the highest-pressure well must be shut in temporarily. If the master well is to be shut in for some time, or if the pressure in another well becomes so high as to necessitate it becoming the key well, the controls can be quickly changed over. Water input to the other slave wells is not affected.

Slave wells can be shut in without making any changes to the instruments or controls. However, thought is given to the volume of water involved. When the volume is substantial, one engine is shut down. If this step is not taken, all the engines may still be pumping too much water after they have dropped to idle.



Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups —U. S., Canadian, and Foreign— and according to type of line—crude, products, or natural gas.

U. S. Crude Oil Pipelines

- **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.
  Project: Line from lower Delaware Bay to Philadelphia.
  Status: Planned.
  Completion: 1960.
- **Cooperative Refinery Association,** Kansas City, Mo.
  Project: 6 miles of 6-in. at Stockton, Kans.
  Status: Planned.
  Completion: Spring 1960.
- **Gillette Pipeline, Inc.,** and **A. W. Hartwig, Inc.**
  Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
  Status: Pending Wyoming Public Service Commission approved.
- **Honolulu Oil Corp.** and six other companies.
  Project: 28-mile crude line connecting Fourbear, Pitchfork, and Spring Creek fields in Wyoming.
  Status: Under way.
  Completion: December 1, 1959.
- **International Oil Pipeline Corp.,** New York City.
  Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canadian Crude-Oil Pipelines).
  Status: Proposed.
- **Ohio Oil Co.,** Findlay, Ohio.
  Project: 60 miles of 8-in. between Scipio field in Michigan and Buckeye Pipe Line Co.'s terminal south of Toledo, Ohio, and a 20-mile spur north into Pulaski and Albion fields.
  Status: Under way.
  Contractor: **O. R. Burden Construction Corp.,** Tulsa.
  Completion: January 1, 1960.
- **Service Pipe Line Co.,** Tulsa, Okla.
  Project: About 5 miles of 3, 4, and 6-in. line at North Sandy Bend pool, Union County, Arkansas.
  Contractor: **Suelling Co.,** Shreveport, La.
  Completion: December 31, 1959.
  Project: 43 miles of 2, 3, 4, and 6-in. gathering line in the Nowata, Okla., area, to replace lines that eventually will be inundated by Oologah Reservoir.
  Status: Under way.
- **Standard Oil Co. of California,** San Francisco.
  Project: 22 miles of 8-in. from Swanson River Unit on Kenai Peninsula to Nikiski on Cook Inlet, Alaska.
  Status: Planned.
  Project: 18 miles of various flow lines in Redwash field near Vernal, Utah.
  Contractor: **Pease Brothers Co.,** Vernal.
  Completion: December 30, 1959.

U. S. Products Pipelines

- **Badger Pipe Line Co.,** Bartlesville, Okla.
  Project: 2½-miles lateral from main Badger line to O'Hare Air Field in the Des Plaines, Ill., area near Chicago.
  Status: Under way.
  Completion: December 1959.
- **Continental Pipe Line Co.,** Ponca City, Okla.
  Project: 155 miles of 6-in. from Artesia, N. M., to El Paso, Tex.
  Status: Under way.
  Contractor: **R. H. Fulton & Co.,** Lubbock, Tex.
  Completion: December 1, 1959.
- **Humble Pipe Line Co.,** Houston, Tex.
  Project: 27 miles of 10-in. from Baytown to Houston.
  Status: Under way.
  Completion: December 31, 1959.
- **Husky Oil Co.,** Cody, Wyo.
  Project: About 100 miles from Cody to the Yellowstone products line west from Billings, Mont.
  Status: Planned.
  Completion: Late 1960.
- **Missouri-Kansas-Texas Railroad.**
  Project: 1,400 miles of LPG line from West Texas to the upper Midwest. The line would originate between Midland and the New Mexico border and would fork at McPherson, Kans. One branch would go to the Minneapolis area, and the other to the Madison, Wis., area.
  Status: Proposed.
- **Wabash Pipe Line Co.,** Findlay, Ohio.
  Project: 29 miles of 12-in. and 9 miles of 16-in. from Griffith, Ind., to Lake Calumet, Chicago, Ill.
  Status: Under way.
  Contractors: **Morrison Constructor Co.,** Hammond, Ind., and **Contracting & Material Co.,** Evanston, Ill.

U. S. Natural Gas Pipelines

- **Anchorage Gas Corp.,** Houston.
  Project: 165 miles of line at least 12-in. in diameter from Kenai Peninsula to Anchorage.
  Status: Planned. Construction may start late April or early May 1960.
- **Arkansas Industrial Pipeline Corp.** (Arkansas Louisiana Gas Co.), Shreveport, La.
  Project: 130 miles of 18-in. from Perla to Helena, Ark.
  Status: Planned.
  Completion: 1960.
- **Arkansas Louisiana Gas Co.,** Shreveport, La.
  Project: 3 miles of 2-in., 58.5 miles of 4-in., and 2 miles of 6-in. gathering line.
  Status: Planned in 1959.
  Project: 77.4 miles of 6-in. transmission lines.
  Status: Planned in 1959.
- **Carolina Pipeline Co.,** Columbia, S. C.
  Project: 85 miles of 8-in. in South Carolina.
  Status: Pending FPC approval.
- **Central Hudson Gas & Electric Corp.,** Poughkeepsie, N. Y.
  Project: 13 miles of 10-in. from Highland to Kingston (Part II), N. Y.
  Status: Planned.
  Completion: 1960.
- **Coastal States Gas Producing Co.,** Corpus Christi, Tex.
  Project: 49 miles of 18-in. and 55 miles of 20-in. from Kelsey Base (Brooks) to Rodriguez field, La Salle County, Texas.
  Status: Under way.
  Contractor: **O. R. Borden Construction Corp.,** Tulsa.
  Completion: December 1, 1959.
  Project: 60 miles of 10-in. in La Salle and Frio counties, Texas.
  Status: Planned.
  Completion: June 1960.
- **Colorado Interstate Gas Co.,** Colorado Springs, Colo.
  Project: 109 miles of 26-in. from Four-Way station in Texas Panhandle, to Morton Junction in southeastern Colorado; 135 miles of 34-in. from there to Pueblo, and 100 miles of 30-in. on to Denver; 148 miles of 34-in. from CIG line at Rock Springs, Wyo., to Provo, Utah, to connect with proposed El Paso Natural Gas Co.'s line to California.
  Status: Planned.
  Completion: January 1, 1961.
- **Colorado Oil & Gas Corp.,** Denver.
  Project: 402-mile line from Gubik field to Fairbanks, Alaska.
  Status: Proposed.
- **Columbia Gulf Transmission Co.,** Houston.
  Project: 11 miles supply line connecting Black 17 field, East Cameron area, Louisiana.
  Status: Approved.
  Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, Louisiana, and 9 miles of various-size field lines in Acadia and Vermilion parishes, Louisiana.
  Status: Approved.
  Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, Louisiana, and 3 miles of 6-in. loop in Cameron Parish, Louisiana.
  Status: Approved.
  Project: 42 miles of 24-in. in Vermilion, Iberia, and St. Mary parishes, Louisiana.
  Status: Under way.
  Contractor: **Western Pipe Line, Inc.,** Austin, Tex.
  Completion: December 31, 1959.
- **Consumers Power Co.,** Jackson, Mich.
  Project: 121 miles of 26-in. from the Indiana-Michigan border to Northville, Mich., and 22 miles of 24-in. from Northville to Clarkston, Mich.
  Status: Starting date indefinite due to steel strike.
  Contractor: **Cape Construction Co., Inc.,**

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Cape Girardeau, Mo.
Completion: 1960.

- **El Paso Natural Gas Co.,** El Paso, Tex.

Project: 34.2 miles of 20-in. from Puckett, Tex., to Goldsmith plant; 51.3 miles of 20-in. from Terrell to Puckett Plant discharge; and 23 miles of 20-in. from Goldsmith to Eunice-Dumas line.
Completion: January 1960.
Project: 244 miles of 30-in. Permian-San Juan Line loops.
Completion: January 1960.
Project: 87 miles of gathering lines in Bisti field in San Juan County, New Mexico.
Status: Has temporary FPC approval.
Project: 395 miles of 34-in. from Salt Lake City, to California border near Las Vegas, Nev.
Status: Pending FPC approval.
Completion: January 1, 1961.
Project: 14 miles of 16-in. to deliver gas to the Ocotillo steam-electric generating plant near Phoenix, Ariz.
Status: Under way.
Contractor: **Eastern Pipeline Contractors,** Dallas.

- **Equitable Gas Co., Pittsburgh.**

Project: 15.3 miles of 16-in., 3 miles of 20-in. in West Virginia and Pennsylvania.
Status: Planned.
Completion: Fall 1960.
Project: 14.7 miles of 16-in., 5.9 miles of 20-in. in Pennsylvania.
Status: Planned.
Completion: Fall 1961.
Project: 17.25 miles of 20-in. in Pennsylvania.
Status: Planned.
Completion: Fall 1962.

- **Gulf Refining Co.,** Houston.

Project: 17 miles of 4, 6, 8, 10, and 12-in. gathering lines in Puckett field, Pecos County, Texas.
Status: Under way.
Contractor: **Houston Contracting Co.**

- **Gulf Resources, Inc.,** New York.

Project: 136 miles of 14 and 20-in. from Hidalgo County to LaSalle County, Texas.
Status: Pending FPC approval.

- **Hope Natural Gas Co.,** Clarksburg, W. Va.

Project: 20 miles of 24-in. line in Wetzel and Monongalia counties, West Virginia, replacing two 16-in. lines.
Status: Approved.

- **Iron Ranges Natural Gas Co.,** St. Paul.

Project: 79 miles of 10 and 12-in. from Grand Rapids to Hoyt Lake, Minn., and 67 miles of 12-in. from Duluth to Silver Bay, Minn.
Status: Approved by FPC.
Completion: 1960.

- **Iroquois Gas Co.**

Project: 9.5 miles of 16-in. in Erie County, New York.
Status: Pending FPC approval.

- **Laclede Gas Co.,** St. Louis, Mo.

Project: 107 miles of 24-in. between Hallsville, and St. Louis, Mo.
Status: Proposed.

- **Lone Star Gas Co.,** Dallas.

Project: About 7 miles of 10-in. lateral from North Doyle dehydration plant in Stephens County to Carter-Knox field, Grady County, Oklahoma.
Status: Approved by FPC.

- **Lone Star Gas Co.** and **Coastal States Gas Producing Co.**

Project: 37 miles of gathering line in North Texas.
Status: Planned.

- **Michigan Wisconsin Pipe Line Co.,** Detroit.

Project: 134.4 miles of 24-in., 27.9 miles of 20-in., 96.3 miles of 16-in., and 118 miles of smaller diameter lines, in Wisconsin and Michigan.
Status: Approved.
Completion: 1960.

- **Midwestern Gas Transmission Co.,** Houston.

Project: 504 miles of 24-in. from Emerson, Man., to Marshfield, Wis., plus 54 miles of sales laterals.
Status: Approved by FPC.
Completion: 1960.

- **Mississippi River Transmission Corp.** (Mississippi River Fuel Corp.), St. Louis.

Project: 115 miles of 24-in. from near Oran in southeast Missouri, north between Ste. Genevieve and Bonne Terre into vicinity of Herculaneum and Pevely then into St. Louis County.
Status: Planned.
Completion: Last half 1960.

- **Natural Gas Pipeline Co. of America,** Chicago.

Project: 29 miles of 12-in. lateral from Enville and Southwest Enville fields, Love County, Oklahoma.
Status: Approved.
Completion: Tentatively December 31, 1959.
Project: 16 miles of 3, 4, and 6-in. gathering system laterals in Jack and Wise counties, Texas.
Completion: December 31, 1959.

- **Niagara Mohawk Power Corp.,** Syracuse, N. Y.

Project: 104 miles of 12-in. from Watertown, N. Y., to Massena, N. Y.
Contractor: **Fulghum Contracting Corp.,** Harrisburg, Pa.

- **Northern Natural Gas Co.,** Omaha, Neb.

Project: 217 miles of main line, 221 miles of main-line loops, and 2,178 miles of branch lines of various diameters.
Completion: 1959-60.
Project: 36.5 miles of 2 to 16-in. gathering lines at Otis gas field, Rush County, Kansas, for underground storage, and 36.7 miles of 30-in. transmission line connecting Otis storage area to main line at Bushton, Kans.
Status: Pending FPC approval.
Project: About 21 miles of 16-in. and 26 miles of various small diameter pipeline in the Glick field, Kansas, area in Kiowa, Comanche, and Barber counties.
Status: Pending FPC approval.
Project: 188 miles of 24-in. and 215 miles of 30-in. from Farmington, Minn., to International border.
Project: 8 miles of 30-in. main line loop north of Ventura, Iowa, and 22 miles of branch lines near Marshalltown and Griswold, Iowa.
Status: Approved by FPC.

- **Ohio Fuel Gas Co.,** Columbus, Ohio.

Project: About 30 miles of 18 through 24-in. in various locations in Ohio.
Contractor: **Shamrock Construction Co.,** Lansing, Mich.

- **Pacific Gas & Electric Co.,** San Francisco.

Project: 120 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.
Completion: 1960-61.
Project: 42 miles of 30-in. from Pittsburg to Irvington, Calif.
Status: Planned.
Completion: 11 miles in 1959; 31 miles in 1960.
Project: 296 miles of 36-in. from Klamath Falls, Ore., to Antioch, Calif.
Status: Pending Canadian export permit and FPC approval.
Completion: 1961.

- **Pacific Gas Transmission Co.** (Pacific Gas & Electric, San Francisco).

Project: 614 miles of 36-in. from Kingsgate, B. C., to California border near Klamath Falls, Ore.
Status: Pending approval of FPC and Canadian authorities to import gas. To start late 1959.

- **Pacific Lighting Gas Supply Co.,** Los Angeles.

Project: 116 miles of 34-in. from Needles to Newberry, Calif.
Completion: June 1, 1960.

- **Pacific Northwest Pipeline Corp.,** Salt Lake City.

Project: 17 miles of 30-in. loop of Spokane-Coeur d'Alene lateral.
Status: Pending FPC approval.
Completion: 1961.
Project: 59 miles of 16 and 20-in. lateral line from a point on main line near Vancouver, Wash., to Salem, Ore.
Status: Pending FPC approval.

- **Panhandle Eastern Pipe Line Co.,** Kansas City.

Project: 3 miles of 4-in. lateral line, and 30 miles of 4-in., 4 miles of 6-in., and 4 miles of 8-in., gathering line.
Contractor: **Hall Construction Co.**
Completion: December 31, 1959.

- **Pennsylvania Gas Co.,** Warren, Pa.

Project: 23 miles of 10-in. in Erie County, Pennsylvania, 15 miles of 8-in. in Warren and Chautauqua counties, Pennsylvania; 30 miles of branch lines, and several small distribution lines.
Status: Approved.

- **Phillips Petroleum Co.,** Bartlesville, Okla.

Project: 37 miles of 3 to 8-in. gathering lines in Lea and Eddy counties, New Mexico.
Status: Under way.
Contractor: **Lasley Construction Co.,** Hobbs, N. M.
Completion: December 1, 1959.

- **Pioneer Natural Gas Co.,** Amarillo, Tex.

Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
Status: Pending FPC approval.
Project: 12 miles of 10-in. from Muleshoe, Tex., northward.
Status: Pending FPC approval.

- **Public Service Co. of North Carolina,** Gastonia, N. C.

Project: About 47 miles of 4, 8, and 10-in. in North Carolina.

- **Rio Gas Gathering Co.,** San Antonio, Tex.

Project: 91 miles of 3 to 8-in. gathering line in Hidalgo County, Texas.
Status: Pending FPC approval.
Completion: 1959.

- **Shamrock Oil & Gas Corp.,** Amarillo, Tex.

Project: 49 miles of 20-in. from Dumas to Amarillo.
Completion: Early 1960.
Project: 70 miles of 16-in. from Ochiltree to McKee in the Texas Panhandle, to move wet gas to a plant where liquids will be removed.
Completion: June 1, 1960.

- **South Texas Natural Gas Gathering Co.** (Coastal States Gas Producing Co., Corpus Christi, Tex.)

Project: A 60-mile line from existing system to steam generating plant in Pearsall County, Texas.
Completion: January 1960.
Project: 125 miles of 8, 10, 14, 18, and 20-in. line in Jimm Hogg County, Texas.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.,** Tulsa.

- **Southern California Gas Co.,** Los Angeles.

Project: 106 miles of 36-in. and 11 miles of 34-in. from Newberry, Calif., to Placentia.
Status: Proposed.
Completion: January 1, 1961.
Project: 91 miles of 34-in. from Newberry, Calif., to Ivanpah Lake.
Status: Proposed.
Completion: January 1, 1962.

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Project: 3 miles of 34-in. in Sullivan Canyon northerly from San Vicente Boulevard, Los Angeles.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.**, San Francisco, Calif.
Completion: December 1959.
Project: 10 miles of 34-in. from Western terminal to Burbank line.
Status: Proposed.
Completion: December 1961.

- **Southern Natural Gas Co.**, Birmingham, Ala.

Project: 80 miles of 18-in. from Greenville to Cranfield, Miss.
Status: Under way.
Contractor: **Oklahoma Contracting Co.**, Dallas, Tex.

- **Spur Oil Co.**, Houston.

Project: 12-mile system in Hull, Tex., field.

- **Tennessee Gas Pipeline Co.**

Project: About 30 miles of 30-in. in Kentucky and 28 miles of 26-in. in Kentucky and West Virginia.
Status: Under way.
Contractor: **H. C. Price Co.**, Bartlesville, Okla.
Completion: Fall 1959.
Project: 21 miles of 16-in. gathering line from Louisiana coast to Block 46 in the Vermilion area.
Status: Pending FPC approval.
Project: 2 miles of 12-in. gathering line from Block 66 to Block 64, East Cameron area, offshore Louisiana.
Status: Pending FPC approval.
Project: 158 miles of 36-in. gas loop at various points between Kinder, La., and Centerville, Tenn.
Status: Approved by FPC.
Project: 41 miles of 30-in. loop east of Hamburg, N. Y.
Status: Pending FPC approval.
Project: 25 miles of 30-in. loop near Kane, Pa.
Status: Pending FPC approval.

- **Tensas Gas Gathering Corp.**

Project: 37 miles of 2 to 8-in. from Rodney field, Miss., westerly to connect with Olin Gas Transmission Co., line in Tensas Parish, Louisiana.
Status: Approved.

- **Texas Eastern Transmission Corp.**, Shreveport, La.

Project: 22 miles of 14-in. from Rayne field, to Opelousas, La.
Status: Under way.
Project: 81 miles of 24-in. from Tamarack, to Perulack, Pa.
Status: Pending FPC approval.
Project: 40 miles of 36-in. from Lambertville, to Linden, N. J.
Status: Pending FPC approval.
Project: 23 miles of 20-in. from Eagle, to Chester Junction, Pa.
Status: Pending FPC approval.
Project: 4 miles of 30-in. from Linden, to Staten Island, N. J.
Status: Pending FPC approval.
Project: 65 miles of 30-in. from Perulack, Pa., to Lambertville, N. J.
Status: Pending FPC approval.

- **Texas Electric Service Co.**, Fort Worth, Tex.

Project: 200-mile 22 or 24-in. line from Old Ocean field, Brazoria County, Texas, to Fort Worth, and 70-mile 16-in. line from there to Graham, Tex.
Status: Planned.
Completion: Fall of 1960.

- **Texas Gas Transmission Corp.**, Owensboro, Ky.

Project: About 93 miles of 30-in. in Kentucky, Tennessee, and Mississippi.
Status: Under way.
Contractor: **Western Pipe Line, Inc.**, Austin, Tex., has contract for 93 miles of this project.
Completion: December 1, 1959.
Project: 81.7 miles of 26-in. in Kentucky, Indiana, and Ohio, and 6.9 miles of 12-in. near Dixie, Ky.
Status: Under way.
Contractor: **Western Pipe Line, Inc.**, Austin, has contract for the 26-in. line.
Completion: December 1, 1959.
Project: 93 miles of supply lines in Louisiana and adjacent offshore areas.
Status: Under way.
Contractor: **Houston Contracting Co.** has contract for 32 miles of 12-in. from South Roanoke gas field to Grand Cheniere, La.

- **Texas Illinois Natural Gas Pipeline Co.**, Chicago.

Project: 371 miles of 30-in. loop of present system between Texas and Chicago.
Status: Pending FPC approval.
Completion: 1960.
Project: 10.6 miles of 8-in. line in Starr and Hidalgo counties, Texas.
Status: Pending FPC approval.

- **Transcontinental Gas Pipe Line Corp.**, Houston, Tex.

Project: 36-in. loops on the 1,800-mile system from Texas to New York. This would be the beginning of a third complete line.
Status: Planned.
Project: 29 miles of 20-in. in McMullen and La Salle counties, Texas.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.**, Tulsa, Okla.
Completion: December 1, 1959.
Project: 38 miles of 30-in. main line loop in various locations.
Status: Pending FPC approval.
Completion: 1959.
Project: 74 miles of 36-in. main line loop in various locations.
Status: Pending FPC approval.
Completion: 1959.
Project: 45 miles of 30-in. main line loop in various locations.
Status: Pending FPC approval.
Completion: 1960.
Project: 78 miles of 36-in. main line loop in various locations.
Status: Pending FPC approval.
Completion: 1960.
Project: 13 miles of 24-in. Louisiana purchase lateral.
Status: Temporary authorization.
Completion: 1959.
Project: 18 miles of 20-in. Pennsylvania and New Jersey loop.
Status: Temporary authorization.
Completion: 1959.
Project: 40 miles of 8 to 20-in. Louisiana purchase lateral.
Status: Pending FPC approval.
Completion: 1959.

- **Transwestern Pipeline Co.**, Houston.

Project: 490 miles of 24 and 20-in. from Texas to Roswell, N. M., and 670 miles of 30-in. from Roswell to Topock, Ariz., near the California border. Also, 300 miles of 10, 12, and 16-in. lateral lines in Texas and New Mexico.
Status: Under way.
Contractors: **Houston Contracting Co.**, Houston, and **H. C. Price Co.**, Bartlesville, Okla., have joint contract to build the main line. Houston Contracting will build 149 miles of 30-in. from Corona, N. M., west to McCartys, N. M.; 55 miles of 30 and 89 miles of 24-in. from Corona east to Roswell and southeast to Carlsbad; 61 miles of 20 and 76 miles of 24-in. from Fort Stockton, Tex., to Carlsbad; and 166 miles of 24-in. from Roswell northeast to Dawn, Tex. Price will handle two main-line spreads totaling 335 miles in Arizona. As for the 300 miles of laterals, Houston Contracting will carry out this work with **R. H. Fulton & Co.**, Lubbock, Tex., and **Western Pipe Line, Inc.**, Austin, Tex. Western will build 100 miles of 10, 12, and 16-in. in West Texas and New Mexico.
Completion: June 1960.
Project: 250 miles of 4, 6, and 8-in. gathering lines in the Texas Panhandle, northwestern Oklahoma, Southwest Texas, and southeastern New Mexico. This project is in conjunction with the 1,160-mile Texas-California line (see above).
Contractor: **Sheehan Pipe Line Construction Co., Tulsa.**

- **Trunkline Gas Co.**, Houston, Tex.

Project: 24.5 miles of 12-in. gathering line from Lowry, to Cameron Parish shoreline, Louisiana.
Status: Under way.
Contractor: **Sam Carline, Inc.**, Berwick, La.
Project: 42 miles of 24-in. loop from west of Moss Hill, to Silsbee, Tex.
Status: Under way.
Contractor: **Sharman, Allen, Gay & Taylor, Inc.**, Houston.
Project: 53 miles of 30-in. loop from Pitkin, to Pollock, La.
Status: Under way.
Contractor: **Grayco Constructors, Inc.**, Austin, Tex.
Project: 61 miles of 30-in. loop from Pollock, to Riverton, La.
Status: Under way.
Contractor: **APV Co., Inc.**
Project: 177 miles of 30-in. loops in Louisiana, Arkansas, Mississippi, Tennessee, and Kentucky.
Status: Under way.
Contractor: **Panama, Inc., Houston.**
Project: 62 miles of 26-in. extension from Bourbon to Rossville, Ill.
Status: Under way.
Contractor: **Contracting & Material Co.**, Evanston, Ill.
Project: 137 miles of 26-in. extension from Rossville, Ill., to Vistula, Ind.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.**, San Francisco, Calif.

- **United Fuel Gas Co.**, Charleston, W. Va.

Project: About 5 miles of 16-in. transmission line near Huntington, W. Va.
Status: Approved by FPC.

- **United Gas Pipe Line Co.**, Shreveport, La.

Project: 14 miles of 12-in. to connect North Henderson field area, Rusk County, Texas.
Status: Approved by FPC.
Project: 20 miles of 16-in lateral in Louisiana.
Status: Approved by FPC.
Project: 8.7 miles of 30-in. line paralleling part of existing line from Agua Dulce field, Texas, which will be submerged by flood-control program.
Status: Approved by FPC.
Project: 27 miles of 20-in. and three 12-in. Mississippi River crossings near Empire, south of New Orleans, La.
Status: Under way.
Contractor: **Houston Contracting Co.**

- **Valley Gas Transmission, Inc.** (Fish Engineering Corp.), Houston.

Project: 150 to 160 miles of 3 to 6-in. gathering lines to tap fields in Starr, Hidalgo, Brooks, and Jim Wells counties, Tex.
Status: Pending FPC approval.

Canadian Crude Oil Pipelines

- **Act Oils, Ltd.**

Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Kitimat, B. C.
Status: Pending British Columbia Government approval.

- **Bituminous Oil Pipeline Co.** (Royalite Oil Co., and Can-Amera Oilsands De-

PIPELINE CONSTRUCTION

velopment, Ltd.)

Project: A 250-mile line from Athabasca oil sands in northeastern Alberta to Edmonton.

Status: Proposed.

Completion: 1960.

- **Gibson Crude Oil Purchasing Co., Ltd.,** Calgary.

Project: 180-mile 8-in. line from Milligan Creek, B. C., to Grand Prairie, Alta.

Status: Permit sought from B. C. government.

- **Independent Pipe Line Co.** (Home Oil Co.), Calgary.

Project: 1,073 miles of 36-in. from Edmonton, Alta., to Superior, Wis.; 946 miles of 34-in. from Superior to Montreal, Que.; 72 miles of 16-in. and 74 miles of 10-in. feeder lines from Calgary to Bellshill Lake, Alta., on the 36-in. line.

Status: Proposed.

- **Mid-Continent Pipe Lines, Ltd.,** Edmonton, Alta.

Project: 1,500 miles of 30-in. from Edmonton to Chicago, via Saskatchewan, North Dakota, Minnesota, Wisconsin, and Illinois. U .S. section to be owned by International Oil Pipeline Corp., New York City.

Status: Pending Canadian Board of Transport Commission approval. W. C. Gilman & Co., New York City, has made preliminary study.

- **Peace River Oil Pipe Line Co., Ltd.,** Calgary, Alta.

Project: 130-mile 12-in. line from Virginia Hills through Windfall to the main line linking with Trans Mountain Pipe Line in Alberta.

Status: Pending government approval.

Project: 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek Pump Station to Windfall, Virginia Hills, and Swan Hills fields in Alberta.

Status: Approved.

- **Producers Pipelines, Ltd., Regina, Sask.**

Project: 25-mile 4-in. line to connect Parkman Mississippian pool in southeast Saskatchewan.

Status: Pending approval of Saskatchewan government.

- **Rangeland Pipe Line Co.,** Calgary.

Project: 111-mile line from Cessford field to Calgary.

Status: Pending approval of Alberta government.

- **Trans-Prairie Pipelines, Ltd.,** Edmonton, Alta.

Project: 6-8-in. line from Weyburn field to Regina and Moose Jaw, Sask.

Status: Proposed.

Canadian Products Pipelines

- **Foothills Products Pipe Line, Ltd.** (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.

Project: Gathering system to connect Alberta gasoline plants to trunk line from Alberta to Pacific Coast.

Status: Proposed.

- **Hydrocarbons Pipeline Co.,** Winnipeg, Man.

Project: 800 miles of 6, 8-in. LPG line from near Edmonton to Fort William, Ont.

Status: Has Parliament of Canada approval. Seeking approval of Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.

Contractor: **Dutton - Williams Brothers, Ltd., Calgary,** and **A. D. Little Co., Boston,** are consultants.

- **Pembina Pipe Line, Ltd.,** Edmonton, Alta.

Project: A 1,200-mile line to carry sulfur, LPG, and natural gasoline from Alberta's gas fields to eastern Canada.

Status: Proposed.

Canadian Natural Gas Pipelines

- **Alberta Gas Trunk Line Co., Ltd.,** Calgary.

Project: 256 miles of 36-in., 75 miles of 30-in., 55 miles of 26-in., 199 miles of various diameter gathering lines, and 42 miles of 16-in. delivery lateral. Main line is from Berland River, Alta., to Crows Nest Pass.

Status: Approved by Alberta government. Work to start at the beginning of the 1960 construction season. Line may be in operation by the end of 1961.

- **Alberta Natural Gas Co., Ltd.** (Pacific Gas & Electric Co., San Francisco, and Westcoast Transmission, Calgary).

Project: 108 miles of 36-in. across southeastern British Columbia to U. S. border near Kingsgate, B. C.

Status: Pending approval of Canadian and U. S. regulatory agencies. To start late 1959.

- **British Columbia Electric Co.**

Project: 35 miles of 30-in. from Huntington, B. C., to Vancouver.

Completion: 1960.

- **Cartier Gas Corp.** (St. Maurice Gas, Inc. and Consumers' Gas Co., Toronto).

Project: 170 miles from Montreal to Quebec City.

Status: Proposed.

- **Northern Natural Gas Co., Omaha.**

Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alta.

Status: Planned.

Project: 32 miles of 24-in. from Pincher Creek to Montana border to tie in with planned U. S. line on to Minneapolis.

Status: Planned.

- **Trans-Canada Pipe Lines, Ltd.,** Toronto.

Project: 500 miles of main-line loops.

Status: Planned.

Completion: Late 1962.

Project: 74 miles of 34-in. main-line loop and 51-mile 30-in. lateral from Emerson, Man., to U. S. border near Noyes, Minn., to connect with proposed Midwestern system now before U. S. FPC.

Status: Pending government approval.

Completion: Fall 1960.

- **Van Tor Oil & Exploration Co.,** Vancouver, B. C.

Project: Line from British Columbia mainland to Vancouver Island.

Status: Proposed.

Completion: 1960.

- **Westcoast Transmission Co., Ltd.,** Calgary.

Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Project: 250 miles of 30-in. from Taylor to Fort Nelson, B. C.

Status: Planned.

Foreign Crude Oil Pipelines

- **Arab Pipeline.**

Project: 1,250-mile pipeline from the Persian Gulf to Mediterranean serving fields in Saudi Arabia, Kuwait, Iran, and Iraq.

Status: Proposed by Saudi Arabian Government as project of Arab countries, and approved by the Arab League's petroleum department.

- **Arabian American Oil Co.,** Dhahran, Saudi Arabia and N. Y. C.

Project: 63 miles of 30, 32-in. from Khursaniyah to Ras Tanura.

Contractor: Company personnel.

Completion: January 1, 1960.

Project: 18 miles of 34, 36-in. from Qatif to Ras Tanura.

Status: Planned.

Contractor: Company personnel.

Completion: July 1, 1962.

Project: 6 miles of 30-in. from Ras Tanura to Ras Tanura terminal; 4 miles of 14-in. from Buqqa to QA-2 pipeline.

Status: Planned.

Contractor: Company personnel.

Completion: October 1, 1960.

- **Barnabos Group** (Italian interests).

Project: A line from Venice, Italy, to Innsbruck, Austria, which could then be extended to Munich, Germany.

Status: Planned.

- **Basrah Petroleum Co.**

Project: 65 miles of 30 and 32-in. from Zubair to Fao in southern Iraq.

Contractor: **Turriff-Burden, Ltd., Tulsa.**

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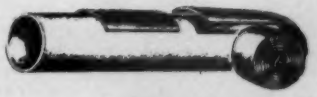

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PIPELINE CONSTRUCTION

Completion: 1961.

- **Bolivia-Paraguay.**

Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.

Status: Planned.

- **British Petroleum, Ltd.**

Project: 60 miles of 18-in. across South Wales, from Milford Haven to the Llandarcy refinery.

Status: Under way.

Completion: Late 1959.

- **Cie. des Transports par Pipe-Lines au Sahara** (subsidiary of Cie. de Recherches et d'Exploitation de Petrole au Sahara), Paris.

Project: 470 miles of 24-in. from Edjele fields in Sahara to the Tunisian Mediterranean Coast.

Contractors: **Groupement des Societes Entrepose et Parisienne pour l'Industrie Electrique en vue de l'Etude et de la Construction de Pipe-Lines,** and **Ste. des Grands Travaux de Marseille.** Engineering firm on the job is **Bechtel Mediterraneenne** S. A. (subsidiary of **Bechtel Corp.,** San Francisco).

Completion: End of September 1960.

- **Eastern Block Council for Mutual Economic Aid.**

Project: 2,500-mile "Vomecon" pipeline from the Volga-Ural oil fields in Russia to East Germany, Poland, Czechoslovakia, and Hungary. The system will originate at Kuybyshev on the Volga River and will split into two branches at the Dneiper River, one going to Poland and Germany, the other to Czechoslovakia and Hungary. Expected capacity, 300,000 bbl. daily.

Status: Construction under way in Czechoslovakia, with completion of this section by early 1961.

- **Elburz Oil Corp.**

Project: 1,000 miles of 38-in to move Qum crude to the Mediterranean.

Status: Planned.

- **Empresa Nacional de Petroleo,** Chilean Government company.

Project: 35-mile 8-in. outlet for fields in the Punta Delgada area of Magallanes Province.

Status: Under way.

Completion: March 1960.

- **ENI (Italian state oil agency)** and **Italo-Swiss Finance Co.**

Project: A 700-mile system from Genoa to Aigle, Switzerland, thence northeast to the German border, where it would split with one branch going to Munish and another branch to the Karlsruhe area. Feeder lines would go to Turin, Milan, and Cremona, Italy.

Status: The trunk line from Genoa to Aigle has been approved by the Italian Government.

- **Iranian Oil Participants, Ltd.**

Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bander Mashur line.

Status: Planned.

Project: 99 miles of 26, 28, and 30-in. from Gach Saran field to new terminal at Kharg Island in the Persian Gulf.

Status: Under way.

Contractor: A joint venture of **Raymond Concrete Pile Co.** and **Williams Bros. Co.,** Tulsa, **Richard Costain, Ltd.,** and **John Brown, Ltd.,** London, and **Werkspoor & Bredoro,** The Netherlands.

- **Iraq Petroleum Co.,** London.

Project: 250 miles of 30 and 32-in. in northern Iraq from Kirkuk to the Syrian border.

Contractor: **Turriff-Burden, Ltd.,** Tulsa.

Completion: 1961.

Project: About 60 miles of 30 and 32-in. loop in Syria.

PIPELINE CONSTRUCTION

Status: Under way.
Completion: Last half 1959.

• **Israel Government.**
Project: 16-in. loop of 8-in. line on 235-mile Gulf of Aqaba-Haifa system.
Status: Proposed.
Project: Replace 125 miles of 8-in. from Elath to Beersheba with 16-in.
Status: Under way.
Completion: Mid-1960.

• **Mene Grande Oil Co.,** Caracas, Venezuela.
Project: 24 miles of 16-in. from Zarza to Zulus; 12 miles of 24-in. from West Guara to Oficina; 5 miles of 24-in. near Melones.
Completion: 1959.

• **Middle East Pipeline.**
Project: 1,500 miles of 38, 40-in. from Persian Gulf to Mediterranean at Iskenderun, Turkey.

• **Oil India Private Ltd.** (Burmah Oil Co. and Assam Oil Co., two-thirds, and India Government one-third).
Project: 720 miles of line in northeast India. This would include 260 miles of 16-in. from Nahorkatiya to Noonmati (site of proposed refinery), and 460 miles of 14-in. from Noonmati to Barauni (site of another proposed refinery).
Status: Planned.

• **Pan American International Oil Co.,** New York.
Project: 84-mile 12 to 14-in. line from Comodoro Rivadavia field to Argentina's Atlantic Coast.
Status: Under way.

• **Petroleo Brasileiro S. A. (Brazil).**
Project: 70 miles of 22-in. from Sao Sebastiao to Cubatao.
Status: Pending approval.
Contractor: **Techint, Inc.,** Milan, Italy.
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.

• **Rotterdam-Rhine Pipeline Co.** (Caltex Petroleum Maatschappij, Bataafsche Petroleum Maatschappij, Gelsenberg Benzin, A. G., and Mobil A. G.)
Project: 59 miles of 30-in. and 96 miles of 24-in. from Rotterdam to Ruhr industrial area in West Germany to supply refineries at Godorf and Wesseling, and a 25-mile branch to Wessel to serve the refinery in Gelsenkuchen.
Status: Under way.
Contractor: **Bechtel International Co.,** is project manager. **Associated Pipe Line Contractors** has most of construction. German and Dutch firms have 33 miles of 24-in. in south Holland and four major submarine crossings.
Completion: Mid-1960.

• **Royal Dutch-Shell.**
Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through eastern France, Luxembourg, West Germany, Netherlands, and Belgium. Main line to be 30-in.
Status: Considering project as joint venture with several other companies.
Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.
Status: Planned.
Contractor: **Williams Brothers Overseas, Ltd.,** Tulsa, and **John Brown, Ltd.,** London.
Completion: January 1, 1962.

• **South European Pipeline Co.** (Jersey Standard, Caltex, and 17 European firms).
Project: 419 mile 30-in. line from Lavers, near Marseille, to Strasbourg, with 40-mile extension to Karlsruhe, Germany.
Status: Construction to get under way by January 1961.
Completion: 1962.

• **Superior Oil Co.,** Los Angeles.
Project: A 16 and 24-in. line from its Lake Maracaibo, Venezuela, production to shore.
Status: Planned.
Contractor: **Pipe Line Technologists, C.A.,** Maracaibo, has design.

• **Syrian Pipeline,** Damascus.
Project: 500-mile line from Karshuk field, Syria, to Mediterranean.
Status: Proposed.

• **Union of Soviet Socialist Republic.**
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.
(See Eastern Block for information on new East Europe line).

• **Yacimientos Petrolliferos Fiscales (Argentina),** Buenos Aires.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blancha on the coast.
Status: Bids requested.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

• **Yacimientos Petroliferos Fiscales Bolivianos,** La Paz.
Project: 407-mile 12-in. line from Camiri to Sica Sica.
Status: Planned.

Foreign Products Pipelines

• **Estrada Ferroviaria Santos a Jundiai,** Sao Paulo, Brazil.
Project: 25 miles of 6-in. ethylene line from Cubatao to Rio Grande.
Status: Pending approval.
Contractor: **Techint, Inc.,** Milan, Italy.

• **National Iranian Oil Co.,** Teheran.
Project: 510 miles of 8-in. eastward from Teheran to Meshed, Iran.
Status: Planned.
Contractor: **Williams Brothers,** Tulsa, has contract for about half this project.

• **North Atlantic Treaty Organization** (Bid details from Bureau of Foreign Commerce, U. S. Department of Commerce, Washington).
Project: 57 miles of 8-in. in Germany to Land Baden-Wuerttemberg air field.
Status: Planned.
Project: 93 miles of 6-in. in Turkey.
Status: Bids requested in June 1959.

• **Petroleos Mexicanos.**
Project: Line from Mexico City to Toluca.
Status: Planned.
Project: Line from Mexico City to Cuernavaca.
Status: Planned.
Project: 211-mile 11-in. line from Monterrey to Torreon.
Status: Under way.

• **Pipelines of Puerto Rico,** San Juan.
Project: 95 mile 8-in. line from Commonwealth Oil refinery at Penuelas to Catano in the vicinity of San Juan.
Status: Approved by Puerto Rican Public Service Commission.

• **Syrian Pipeline.**
Project: About 310 miles from a new refinery at Homs to tank farms in the Damascus, Aleppo, and Latakia areas.
Status: Deadline for bids is February 29, 1960.

• **Union of Soviet Socialist Republic.**
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.

• **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

• **Attock Oil Co., Ltd.,** London.
Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.
Status: Planned.

• **Creole Petroleum Corp.,** Caracas.
Project: 17 miles of 30-in., 1.8 miles of 24-in., 1.7 miles of 20-in., and 1.6 miles of 16-in. from Lake Maracaibo flow stations to Conservation plant Bachaquero 1; 22 miles of 12-in. from Bachaquero 1 to Conservation plant Tia Juana 2.
Completion: June 1, 1960.

• **Cuban Gas Transmission Co.**
Project: 500-mile line from Campecho area of Mexico across Yucatan and a 150-mile line on the ocean floor to Havana.
Status: Under study by Ebasco Services.

• **French Government,** Paris.
Project: 400-mile big-inch gas line from Hassi R'Mel field to power plant at Bone, Algeria.
Status: Proposed.

• **Indonesian Government.**
Project: 60-mile line from Radja field to proposed ammonia plant near Palembang, Sumatra.
Status: Planned.
Completion: Ammonia plant is scheduled for completion in 1962.

• **Kuwait Oil Co., Ltd.,** London.
Project: 10 miles of 12, 20, and 24-in. line in Burgan field.
Status: Under way.
Completion: Fourth quarter 1959.

• **Mene Grande Oil Co.,** Caracas, Venezuela.
Project: 20 miles of 12-in. from Soto to Mata.
Completion: 1959.

• **Petroleos Mexicanos,** Mexico, D. F.
Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.
Project: 490 miles of 24-in. from Jose Colomo field in the State of Tabasco to Mexico City.
Status: Under way.
Contractors: Contracts for eight river crossings on the project were awarded to **Collins Construction Co.,** Port Lavaca, Tex., and **Constructora Inde S. A. de C. V.,** Mexico City.
Completion: March 1960.
Project: Line from Pemex City to Irapuato.
Status: Planned.
Completion: 1960.
Project: 211-mile 16-in. line from Monterrey to Torreon.
Status: Under way.
Completion: 1960.

• **Standard-Vacuum Oil Co.,** New York.
Project: 60 miles of 8-in. in Sumatra terminating at Palembang.
Status: Planned.

• **Sui Gas Transmission Co.,** Multan, Punjab, India.
Project: 130-mile extension of the new 310-mile, 16-in. Multan-to-Sui, Pakistan line. Extension will terminate at Lyallpur.
Status: Planned.

• **Union of Soviet Socialist Republic.**
Project: A 465-mile line from Karadag near Baku to Tbilisi and Erevan.
Status: Under way.
Completion: 1960.
Project: A 127-mile line across the Turkmenian Desert from Kizyl-Kum to the Caspian Sea port of Krasnovodsk.
Status: Under way.
Project: Two parallel lines, each over 1,200 miles long, from Gazly, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Proposed.
Project: Line from Samarkand, through Tashkent to Chimkent, Dzhambul, Frunze, and Alma-Ata near the border.

PIPELINE CONSTRUCTION

Completion: Line from Samarkand to Tashkent expected to be finished in 1960. Completion of rest of line expected in 1965.

Project: Line from Sverdlovsk to Omsk, Kemerovo and Tomsk.

Status: Proposed.

Project: Line from Berezovo field to Sverdlovsk.

Status: Proposed.

Project: Line from Stalingrad to Gorky and to Moscow.

Status: Proposed.

Project: Line from Dzhebol field to Izhevsk and to Sverdlovsk.

Status: Proposed.

Project: Line from Gorky to Kaman.

Status: Under way.

Project: Line from Saratov to Sverdlovsk, with branches into Stepanovskoe field.

Status: Proposed.

Project: Line from Kanevskoe (Kraansnedar) field to Sulkhumi.

Status: Proposed.

Project: Line from Shebelinka field to Rostov, to Odessa, and northward to connect with proposed line from Lvov to Leningrad.

Status: Under way.

Project: Line from Riga to proposed line from Lvov to Leningrad.

Status: Proposed.

Project: Line from Rostov to Moscow.

Status: Proposed.

• **Venezuelan Atlantic Transmission Corp.**, Caracas.

Project: 10 miles of 16-in. loop from La Yaguara to Tacagua.

Status: Planned.

Completion: January 1960.

• **Yacimientos Petroliferos Fiscales (Argentina)**, Buenos Aires.

Project: 1,015 miles of 24-in. from Campo Duran to Buenos Aires.

Status: Under way.

Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.), subcontracted to **COGAR** (River Construction Corp., Fort Worth, Tex.), Milton Brazier, superintendent for 700 miles from Buenos Aires to Tucuman, office at Buenos Aires; E. L. (Tex) Maggard, superintendent for 400 miles from Campo Duran to Tucuman.

Completion: December 15, 1959.

Project: Line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26-in. to the connecting point for the Plaza Huincul link and 30-in. from the connection to Buenos Aires.

Alberta Crude Plant Planned

A CRUDE-STABILIZATION plant will be built in Innisfail field, Alberta, by the Innisfail Operators' Committee.

Design capacity will be 10,000 bbl. daily, but the unit is expected to process an average of 7,500 bbl. daily. At this rate the plant will recover about 8,700,000 cu. ft. of gas, 160 bbl. of liquids, and 80 long tons of sulfur daily. Wells in the field will be produced directly to the plant. After stage separation the crude will be stabilized and delivered by automatic custody transfer to existing pipeline systems. Sour gas will be treated and delivered to Alberta Gas Trunk Line Co., Ltd.'s system.

The committee has appointed Canadian Oil Companies, Ltd., as interim plant operator. Canadian Oil Companies plans to build a small refinery in the field.

Principal operators on the committee are Canadian; Calgary & Edmonton Corp. Ltd.; Canadian Superior Oil of California, Ltd.; Imperial Oil Ltd.; Freehold Petroleums, Ltd.; and Hudson's Bay Oil & Gas Co., Ltd.

Tar Sands Eyed Anew

ANOTHER PLAN to extract oil from northern Alberta's oil-rich tar sands has been announced by Great Canadian Oil Sands, Ltd., New York.

Thomas Clarke, general manager of the firm, said the company hoped to recover the oil by steam treatment. They hope to build a plant in northern Alberta in the near future, he said.

Clarke said the process is a perfected version of an old technique—separation of oil from sand by hot water or steam.

The sands, lying along the Athabasca River near Fort MacMurray, hold an estimated 300 billion barrels of oil.

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BETHLEHEM STEEL

BETHLEHEM STEEL

Clete Smith, who helped develop a special solvent formulation for flushing rocket fuel tanks, says you'll like doing business with Columbia-Southern

Technical Service Engineer Clete Smith is one of many Columbia-Southern specialists who recently teamed up to formulate a new solvent for cleaning rocket fuel tanks and other parts without damage to the special metals and alloys used in rocket construction.

Aimed at solving a specific customer problem, this product is one example of Columbia-Southern's emphasis on keeping customers' needs foremost. Throughout the company, the aim is to develop products and methods and to work closely with customers to insure the most effective use of Columbia-Southern chemicals—and service.

For example, Technical Service recommendations on vapor degreasing with Columbia-Southern Trichlor recently saved a large chain-saw manufacturer $2,100 in tank maintenance costs in just 22 weeks. And an analysis of a window-frame vapor degreasing set-up, also using Trichlor, resulted in a 30% reduction in solvent consumption.

These are just some of the reasons why so many companies in every industry find it pleasant—and profitable—to do business with Columbia-Southern. They like the extra service Columbia-Southern routinely delivers along with its quality products.

Anhydrous Ammonia, Barium Chemicals, Benzene Hexachloride, Calcium Chloride, Calcium Hypochlorite (Pittchlor®, Pittabs®), Carbon Tetrachloride, Caustic Potash, Caustic Soda, Chlorine, Chlorinated Benzenes, Chloro IPC, Chrome Chemicals, Hydrogen Peroxide, Muriatic Acid, Pacific Crystals, Perchlorethylene, Rubber Pigments (Calcene®, Hi-Sil®, Silene®), Soda Ash, Sodium Bicarbonate, Sodium Sulfate, Titanium Tetrachloride, Trichlorethylene

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7 powerful steps to high octane

Into one end of this big reactor flow refinery streams almost worthless as automotive fuels. Out the other end runs a river that's rich in high-octane alkylate.

Squatting atop the reactor are seven 50-hp LIGHTNIN Mixers. From each one, a turbine-equipped steel shaft reaches down to whip into an emulsion the isobutane feed, the recycle olefins, and the viscous sulfuric acid catalyst.

Mixing is the heart of this process. With the LIGHTNIN Mixers, every cubic inch of each reaction zone gets a violent, steady churning. Controlled turbulence instantly disperses the incoming olefins. It keeps the emulsion homogeneous, prevents separation of hydrocarbon in any part of the reactor, promotes acid economy and light alkylate yield.

At this one refinery, 28 of these big LIGHTNIN Mixers run day in, day out on alkylation reactors. At other refineries, many more LIGHTNIN Mixers handle the same vital mixing job.

To earn this acceptance, MIXCO engineers studied alkylation processes intensively; made detailed model tests of agitation flow patterns in simulated reactor systems; applied specialized knowledge of the correct loading of mixer impellers to operate under varying reactor conditions.

The same mixing technology is ready to work for you when you specify LIGHTNIN Mixers—whether for a new process, for blending 180,000 barrels of product, for keeping sediment off the bottom of crude storage tanks, or for any of the thousand and one jobs LIGHTNIN Mixers do every day in refineries.

Your LIGHTNIN representative can give you quick, competent help on fluid mixing. He's listed in Refinery Catalog and in the yellow pages of your telephone directory. Or write us direct.

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MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc., 174-m Mt. Read Blvd., Rochester 3, N. Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 19, Ontario

▶▶▶ New Equipment Section

This week's SHOWCASE features . . .

Latest executive airplane shown

. . . will carry six people and luggage 1,000 miles nonstop in less than 5 hours with 45 minutes of fuel reserve left. The Model 65 Queen Air Beechcraft lists for $120,000. It is all-metal low-wing tricycle-geared plane closely resembling a small airliner. Gross weight is 7,700 lb.

Two 340-hp. supercharged fuel-injection engines power the plane at speeds to 239 m.p.h. Cruising speed is over 200 m.p.h. Service ceiling is 27,000 ft. Fully loaded, it can fly as high as 13,000 ft. on one engine. Maximum range is 1,590 miles. Source: **Beech Aircraft Corp., Wichita.**

New nonmetal insulating coupling

. . . offers a way to stop corrosion where dissimilar metals, stray currents, soil conditions, or chemicals are contributing factors. The Conley Tulsa coupling contains no metal. High strength is obtained by placement of glass fibers in the directions of stress. The coupling can be operated at a pressure of 150 psi. with a safety factor of over 10 to 1, the maker reports. Operating temperatures up to 300° F. are feasible, if nonshock pressures do not exceed 100 psi.

The coupling has a glass-fiber-reinforced epoxy structure that gives a positive mechanical break between metal piping to prevent galvanic action. Too, it has an integral dyke to prevent metal-to-metal contact. A heavy-walled laminated structure allows pipe-wrench installation. The coupling is available from stock in IPS sizes of 1 through 4 in. Source: **Ed Conley Plastic Corp., Ninety-first and Delaware, Tulsa 5.**

Now, automated teaching machine

. . . has been developed to meet the needs of complex modern industrial training programs. Called the Tutor, the device is designed to insure active participation by the student while simultaneously grading his work and timing his performance. It presents the information to be learned in words and pictures. It then tests the trainee and advances him at a rate determined by his demonstrated ability to absorb the information presented. In addition, it records the progress of the trainee and gives a record of his approach and reasoning process.

Basically, the device is partly a picture projector that presents moving sequences. It locates and presents any selected image or images when a number is punched on its keyboard. In this way it develops knowledge of the subject step-by-step at the student's own pace. At the same time it prints on a paper tape a step-by-step history of the sequence of images viewed by the student and the time he spent viewing each image. Delivery time for the machine is about 90 days. It sells for about $6,500. The manufacturer prepares all course material. Cost for this is separate from the machine cost. Source: **Western Design Div., U. S. Industries, Inc., Santa Barbara Airport, Goleta, Calif.**

Want more facts about equipment or copies of product literature described in this issue?

Send this Showcase Coupon to manufacturer at address shown in bold type after each item.

Product name, Model no., literature title or number: .....

.....

Described in OIL AND GAS JOURNAL - Issue of November 30, 1959

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

CITY..... STATE.....

Pumped-off wells shut down on time

. . . with a new shutdown timing switch just disclosed, the maker reports. The Timit switch was designed specifically for oil-field use to automatically shut down pumped-off wells, pipeline gathering units, transfer pumps, and other equipment, whether engine or electric-driven. Switch contacts can be arranged to open or close a circuit.

A single movement of the dial-pointed lever activates the switch, winds the clock, and sets the amount of time a motor or engine is to run.

The maker says the spring-free linkage and clutch provide foolproof operation and positively prevent overwinding.

Main components of the switch are the enclosed spring-driven motor (a chart-drive type), enclosed clock movement which is easy to change in the field, and the weatherproof aluminum case. Available from stock, the switch sells for about $55 net. Source: **Knight-Gordon Engineering, 211 Tuloma Building, Tulsa.**

●

Tubing guide shoe withstands impact

. . . that may be encountered while it is used to run tubing in tubingless completions. The new tubing guide shoe for tubingless completions is made of a rugged aluminum alloy.

The maker reports it has been satisfactorily field-tested in numerous West Texas, South Texas, and Gulf Coast area wells. Available from stock, the tubing guide shoe comes in 2 and 2½-in. sizes and sells for about $15. Source: **Texas Iron Works, P. O. Box 16068, Houston 22.**

●

New idea in directional perforators

. . . has been perfected for directionally perforating multiple-string tubingless completions. It is a combination tool that locates collars, positions the perforator in the zone of interest, orients the gun away from the other strings of casing, and perforates the desired zone all on one run in one string of casing.

Run by the maker's standard perforating-logging unit on a conductor line, the directional perforator consists of a collar locator, nuclear orientor, a rotator, and a perforator. A surface recorder charts the location of collars and location of other casing strings. The collar locator picks collars on the trip into the well. When the zone of interest is reached, the orientor scans the zone to locate the position of the other casing strings. This scanning is carried out in stages. After completion of the scanning of a stage, the orientor and perforator are rotated to the next stage by raising or lowering the tool. After scanning is completed, the perforator is positioned by the same rotator to shoot in the safe zone away from other strings. Source: **Lane-Wells Co., Div. of Dresser Industries, Box 1407, Houston.**

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SINCE 1895

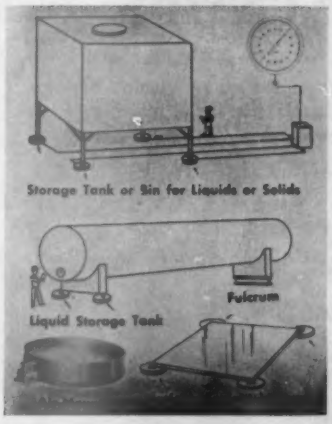
Paint lowers maintenance costs

. . . of exposed steel and aged galvanized-iron surfaces as compared to older types of maintenance paints, the maker says. The paint, No. 13448, is a multipigment type that contains mixtures of stainless-steel flakes (18% Cr, 8% Ni) and nonmetallic pigments in a long oil-alkyd vehicle.

Outstanding advantage cited for the paint is its long durability in corrosive atmospheres. Life expectancy is at least 12 years, the maker reports. The surface is exceptionally smooth.

For longevity, the paint is applied over properly primed surfaces or over old paint in good condition. It isn't applied directly to bare metal. It resists temperatures up to 400° F. Available for immediate shipment, the paint sells for about $8.35 to $8.50 per gallon, depending upon quantity. Source: **Vita-Var Corp., 10 Commerce Court, Newark 2.**

●



Tanks or trucks can be weighed

. . . accurately with a new weighing system now on the market. The Weber Air-Mount weighing system is easy to install without changes in floor construction or foundations. A small load cell placed under each leg of a tank, bin, or platform operates the system. Linear pneumatic pressure is automatically controlled in each load cell and produces a meter signal.

According to the maker, the units have a repeatable accuracy of better than 1/10%. Three Air-Weigh units are available with unit capacities from 3,000 to 30,000 lb. They're priced at about $135 each. Approximate cost of equipment with four Air-Weigh units, tubing, manifold, and gage for a 30,000-lb. tank or bin is $675. Delivery time is about 4 weeks. Source: **Weber Air-Weigh Co., 13845 Elmira, Detroit 27.**

Hardeners let all-solids epoxy

. . . coating be applied with conventional spray equipment. Called Epon curing agents H-1 and H-2, they give controlled reactivity, require no heat to effect curing, are not adversely affected by high humidity, and, when used with a liquid Epon resin base, do not present a fire hazard, the maker reports.

Use of the hardeners with solvent type of coatings based on higher-molecular-weight Epon resins will provide a useful pot life of several weeks, compared with a life of about 1 day with older curing agents.

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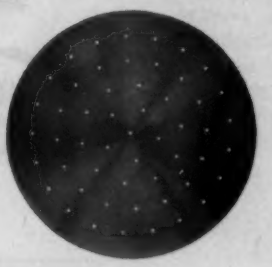

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For raised face or ring type joint flanged unions—for standard or universal orifice fittings. Can be supplied with or without handles or holding rings.

Plates conform to AGA Specifications

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Manufactured to fit cylindrical shells; and spherical, elliptical and flanged and dished heads. Machined from forgings. Faced and drilled to ASA B16.5 specifications.

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Photo courtesy Chemical Process Co.

Colmonoy Hard-Surfacing

Protects Plungers

Pumping Acid and Sand

The acid-oil and sand mixtures pumped by oil-well fracturing specialists are among the most corrosive and abrasive media handled by pumps. In a single fracturing and acidizing job an average of 8,000 gallons of fluid (about 15% hydrochloric acid), carrying about 24,000 pounds of sand, is pumped down a hole. Many of these specialist companies use Colmonoy hard-surfacing alloys to protect their pump plungers from early failure.

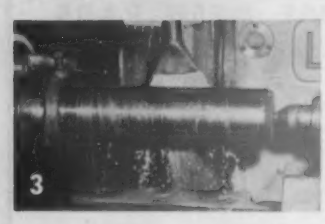
Applying Colmonoy Sprayweld Hard-Surfacing:*

1

Plunger is prepared for spraying by undercutting and grit blasting. The Colmonoy Spraywelder sprays powdered Colmonoy alloy on the turning part.

2

The Colmonoy surface is then heated to about 1900° F. to create a welded bond between overlay and base metal.



3

Sprayweld overlays are smooth and evenly applied, require little finish grinding.

Ask for the Spraywelder Catalog and Colmonoy Hard-Surfacing Manual No. 79.

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SHOWCASE . . .

New Equipment

With the curing agents, single coats up to 10 mils thick can be applied without bubbling or sagging from a vertical surface, the maker says. Potential uses for all-solids epoxy coatings include enamels for patching and painting concrete floors and protective coatings for roofs and gutters. Source: **Shell Chemical Corp., 50 West Fifteth Street, New York 20.**

●

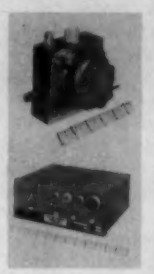
Additive restores oil-base mud

. . . which becomes contaminated during a mud changeover by the clay-water mud it displaces. When oil-base muds become contaminated, viscosity and gel strength suffer and weight material becomes "water wet," especially under high temperature. Special Additive 47 was formulated to combat this condition by restoring an oil-base drilling fluid to its original properties.

The maker reports that the addition of 2 to 4 lb. of Additive 47 per barrel of oil-base mud will disperse the clay particles, thin out any heavy concentration, maintain correct viscosity and gel strength, and keep weight material "oil wet." The additive comes in 425-lb.-net drums (53 gal. net) that sell for $199.75 f.o.b. factory. It's available for immediate delivery. Source: **Oil Base, Inc., 130 Oris Street, Compton, Calif.**

●

Close speed control for engine

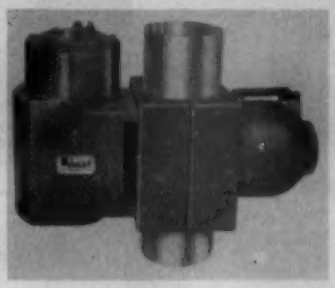


. . . is possible with a new electrical-frequency-sensing governor for diesel and gasoline engines, steam turbines, and gas turbines just announced. The universal electric governor, Model EFG, is designed for constant speed control over a 10% range in 400-cycle service and over a 30% range in 50 to 60-cycle service.

The frequency circuit operates within 3 milliseconds of the time that even the smallest speed change occurs.

An electric control unit is the sensing element of the electric governor. It mixes and amplifies signals. The electrical summation of the variables is magnetically amplified and the resulting error signal is applied push-pull across a hydraulic actuating unit. Adaptable to prime movers of any make or model, the governor sells for from about $360 to $1,050. Delivery time is about 30 days. Source: **Westinghouse Electric Corp., Box 2278, Pittsburgh, Pa.**

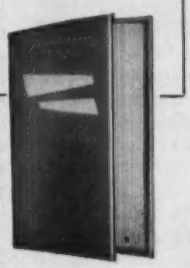
●



Density measured without contact

. . . of liquids flowing through process lines with a new density gage just perfected. The gage uses a point source of radioactive material mounted in a safety-shielded holder on one side of a pipe and a measuring cell on the other side. Two models of the gage

A TREASURY OF . . .
Fascinating information about every phase of
PETROLEUM



Here is a fact-filled account of the petroleum industry—from its geological and archeological beginnings to its present-day products. It tells how petroleum is formed, how it is discovered and brought out of the earth, how it is transformed into a wide variety of products, and how these products are put to work.

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are made, Models PGV and PG. For use on pipes with diameters through 8 in., they automatically measure specific gravity or per cent solids of liquids flowing through process lines.

The cell detects radiation energy in proportion to the density of the material flowing past it. It then converts the measurements into electrical signals that are amplified and fed to a recorder or controller for actuating pumps or valves. Delivery time for the gages is 8 to 10 weeks. Prices of the units start at $1,885 for a 4 to 8-in. pipe size. Source: **Ohmart Corp., Box 67, Station 8, Cincinnati 22.**

Device connects radio to phone

. . . and lets operators of private two-way radio equipment talk from a mobile unit into any public telephone service, either local or long distance. Called the Carterfone, in effect, it places a telephone in each two-way radio-equipped vehicle. It is wired into a base station or remote control.

The transistorized electronic device permits instant switching from broadcasting to receiving without the use of on-off switches. It requires no additional installation in mobile units. An auxiliary speaker provided with the unit lets the base control operator hear when conversation ends. Price: about $185; delivery time; 2 to 3 weeks. Source: **Carter Electronics Corp., 6762 Greenville Avenue, Dallas 31.**

Tank recovers mud from storage pit

. . . at drilling sites. The unit is a skid-mounted vacuum type of tank designed to recover liquid drilling mud from open storage pits. With a capacity of 2,100 gal., the unit offers a way to cut mud waste.

It recovers and discharges mud under pressure through a valve mounted at the front bottom of the tank. Power is supplied by a separate gasoline-driven vacuum pump that can recover 35,700 lb. of 17-lb. mud in about 10 minutes, the maker says. Working pressure of the unit is 50 psi. The tank has a 6-ft. diameter and is slightly less than 10 ft. long. It mounts on a 13-ft., 3-in.-long skid measuring 4 ft. wide. The unit stands 7½ ft. high over-all. Price of the liquid mud tank is about $3,200. Price of the vacuum pump for the tank is about $3,000. Delilvery time is about 4 to 6 weeks. Source: **Delta Tank Mfg. Co., Inc., Box 1469, Baton Rouge.**

Welder adjusts voltage automatically

. . . and only two indicators have to be set to operate the machine—one for electrode size and one for desired current. Two models of the diesel-engine-driven welder are available. Model A3000 W-DS is rated at 60 amp. minimum at 20 volts and 375 amp. maximum at 40 volts. Model A4000 W-DS is rated at 80 amp. at 20 volts and 500 amp. maximum at 40 volts.

Features of the self-contained welders include current curves that remain steady even at extreme ends of the range. Flattening out of peaks allows deep penetration without burnthrough. Generator frames are laminated and welded together. The engines operate at a welding speed of 2,150 r.p.m. and idle at 1,050 r.p.m. A canopy protects operating parts. Rubber shock absorbers isolate vibration from the base and sheet metal. An electrical outlet permits operation of tools and floodlights. Available from stock, the welders sell for about $1,800 to $3,000. Source: **A. O. Smith Corp., Welding Products Div., Milwaukee.**

●

Stop rust with inhibitive primer

. . . just introduced. Drying to a tough, flexible, low-lustre finish in 15 minutes, Totrust Flash-Dry M-50 primer penetrates into rust pits and other surface irregularities to form a bond with the metal surface. The product uses the extreme rust inhibition provided by M-50 (basic lead silico chromate) pigment.

According to the maker, the new primer has proved in exposure and weatherometer tests to offer excellent exterior durability in one coat, as well as resistance to common industrial spillages and fumes. One gallon should provide for 600 to 800 sq. ft. Price is about $6.75 per gallon. The primer is available from stock. Source: **Wilbur & Williams Co., Inc., 650 Pleasant Street, Norwood, Mass.**

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by Melvin G. de Chazeau and Alfred E. Kahn

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SHOWCASE . . .

New Literature

Article covers sieve specifications

. . . from the first fixed-ratio sieve series in 1910 (the Tyler standard screen-scale series), to the resent publication by ASTM of revised specifications for standard testing sieves, known at E-11-58.

The report, contained in the periodical newsletter "The Testing World," includes a chart on U. S. sieves series and shows nominal dimensions, permissible variations, and limits for woven-wire cloth of standard sieves. The publication contains a graph curve showing the relationship of openings to wire diameters, as described in ASTM specifications.

Also included are photos of new Cenco-Soiltest Sieve Shakers, along with other pictures and illustrations pertaining to standard testing sieves. Source: **Soiltest, Inc., 4711 West North Avenue, Chicago 39.**

Rainwear and protective clothing

. . . designed for industrial, utility, and special applications is described in a 12-page brochure just issued. It provides details and illustrations on a variety of suits, coats, pants, aprons, hats, and other accessories.

Basic materials offered are heavyweight neoprene latex for use where climate or other factors demand lighter-weight clothing. Special features of the apparel are outlined in Bulletin 1312-2, including a smooth-finish coating, nylon buttons and suspender clasps, and permanent stenciling for identification.

The literature provides specifications for individual items, including recommended areas of application, resistance characteristics, sizes, and colors. Also given are instructions for care and cleaning of neoprene latex clothing. Source: **Mine Safety Appliances Co., 201 North Braddock Avenue, Pittsburgh 8.**

52-page annunciator-systems

. . . catalog has been made available which is illustrated with equipment photos, charts, and diagrams. Catalog 100C provides extensive information on the function of 12 Panalarm annunciators and their applications.

Various types of annunciator equipment are described with mechanical and engineering data to aid

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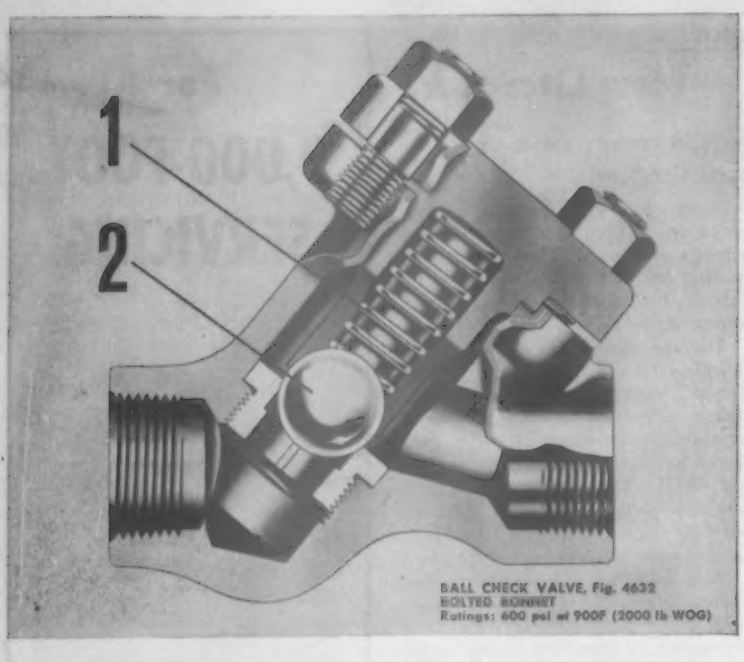

BALL CHECK VALVE, Fig. 4632
BOLTED BONNET
Ratings: 600 psi at 900F (2000 lb WOG)

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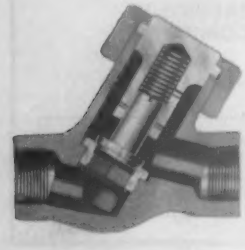
EDWARD BALL CHECK VALVES are specially designed to provide rugged, shock-free service where liquid or heavy viscous fluids are piped. The stainless steel spring (1 above) is sized and rated to give positive seating with heaviest of fluids. And the ball disk (2), made of EValloy 16% chromium stainless steel for tight seating, can be easily replaced when needed.

EDWARD PISTON CHECK VALVES also give freedom from shock or vibration, plus streamlined body design for full flow area and low pressure drop. Exclusive disk guide and spring loading allow for quick, positive seating.

LONG-LIFE FEATURES—Here are just a few design characteristics that make Edward check valves your best buy for petroleum services:

- your choice of screwed, socket welding or flanged ends
- rugged bodies of specially heat treated forged steel
- strong spring of stainless steel for sure closing action
- corrosion-proof stainless steel seats, and stainless steel piston disks or ball disks
- union, screwed, or bolted bonnet available

Edward builds a complete line of cast and forged steel valves for pressures to 10,000 lbs, with flanged, screwed, socket or butt welding ends. For additional information, see your favorite distributor, or write Edward Valves, Inc., 1212 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company.


PISTON CHECK VALVE, Fig. 3578
UNION BONNET
Ratings: 1500 psi at 850F (3600 lb WOG)

EDWARD STEEL VALVES
another fine product by
ROCKWELL

in selecting the proper equipment for various applications. Source: **Panalarm Div., Panellit, Inc., 7401 North Hamlin Avenue, Skokie, Ill.**

Bulletin describes drying equipment

... available for removing moisture from low-pressure gas or air streams. Automatic refrigeration and solid adsorbent dryers are featured, to be used independently or in combination, depending on the end dewpoint required for gas or air streams.

The eight-page literature also contains curves showing per cent of moisture by volume at various temperatures and dew point related to moisture content per 1 M.c.f. of gas or air. Source: **Gas Atmospheres, Inc., 20011 Lake Road, Cleveland 16.**

Positive-displacement diaphragm pump

... for proportioning of chemical solutions, acids, and alkalies to process water is discussed in a new bulletin now being offered. Two-page Bulletin 1210.20-1 contains photographs of three Model 1210 Chem-O-Feeders for proportioning up to 11, 22, and 33 gal. per hour into discharge pressures up to 125 psi.

Also included are typical installation diagrams, a description of the 1/6-hp. feeder and its operation, a feeder capacity chart, and a list of chemical solutions handled by the pump. Source: **B-I-F Industries, Inc., 345 Harris Avenue, Providence, R. I.**

New bulletin outlines services

... of Walworth's technical staff, whose aim is to help you get top performance from valves and fittings. The two-page publication outlines the company program which is concerned with fundamentals, selection, and care of plug valves; solving corrosion and maintenance problems; pressure-seal valves; fittings, flanges, and unions; piping systems; iron valves; ductile iron; three-dimensional photoelasticity and valve design; and fluid-flow analysis. Source: **Walworth Co., 750 Third Avenue, New York 17.**

Wire-rope of all types

... which is used today throughout the oil industry is displayed and discussed in a new condensed recommendations brochure. The four-page bulletin gives descriptions and classifies the ropes as to weights and breaking strengths. Also included are ordering instructions and a wire-rope check list. Source: **Macwhyte Wire Rope Co., Kenosha, Wis.**

▶ ▶ ▶ Equipment Men Notes

Worthington service experts

. . . begin their second rounds of visits this year to every Worthington gas-engine-compressor installation in the pipeline industry. The new concept in customer service, dubbed the Missionary Program, was kicked off early this year when the seven top service engineers from Worthington Corp.'s Engine & Compressor Division in Buffalo were assigned territories. Under the program every corporation pipeline-compressor installation will be visited at least once.

Daniel Orifice Fitting Co. adds

. . . Rex W. Landry to its staff as application engineer in charge of meter-station design. Landry previously was with Houston Flow Measurement Co., and more recently with Ford, Bacon, and Davis, Inc. With the latter firm for 8 years, he worked on projects for Southern Natural Gas Co., Michigan-Wisconsin Pipe Line Co., along with Inland Natural Gas Co., Ltd., in Canada.

Baroid Division gets honor flag

. . . from the United States Treasury Department for Baroid's support in the current savings-bond drive. The flag is presented only to companies which have more than 1,000 employes and achieve 90% employe participation in the program. Examining the flag are J. W. Hofstetter, (left) Baroid's assistant general manager; S. C. Bray, (center) regional director of the Treasury Department's savings-bond division; Harry Dedeaux, (behind flag) savings-bond representative; and E. W. Louden, (holding flag at right) Baroid's assistant general sales manager.

Petrolite builds new production

. . . facilities at Kirby Industrial Estates, near Liverpool, England, to manufacture oil-industry chemicals. William J. Nuelle, vice president and general manager of Petrolite Corp., Eastern Hemisphere Division, reports that work on the new Petrolite, Ltd., facilities should be completed by the first of the year.

The plant, which is expected to be in production by February, will include offices, laboratories, chemical-manufacturing equipment, packaging, and warehousing facilities. Manufacturing equipment will be largely unhoused, similar to contemporary oil-refinery construction, and will be featured by automation and remote-control devices.

Operations will be supervised by C. N. Stehr, managing director of Petrolite, Ltd. Stehr was formerly with Petrolite Corp., Tretolite Co. of California Division, in charge of plant operation and manufacturing.

Allen P. Colby retires

. . . as advertising manager of National Supply Co. after 38 years service with the company. Colby was hired by National in 1921 as a statistician for the company's offices in Toledo. After working with catalog and product bulletins, he was appointed manager of National's advertising and catalog department. Colby acquired the title of advertising manager in 1943.

Thomas H. Smith joins

. . . Dan Goodrich, Advertising, a Dallas agency specializing in petroleum-industry accounts. Smith, former oil editor of The Odessa American and editor and co-publisher of Drill Bit oil news magazine in Odessa, was director of public and industrial relations for Sivalls Tanks, Inc., prior to his Dallas move.

He was also Odessa correspondent for the Associated Press bureau in

This announcement is neither an offer to sell nor a solicitation of an offer to buy these securities. The offer is made only by the Prospectus.

$61,500,000

Transwestern Pipeline Company

$40,000,000

5% Subordinated Debentures, due November 1, 1969

After October 1, 1961 payable at option of Company in 5½% Cumulative Preferred Stock ($100 par value)

2,000,000 Shares

Common Stock ($1 par value)

The Debentures and the Common Stock are being offered only in Units, each consisting of $100 principal amount of Debentures and 5 shares of Common Stock—a total of 400,000 Units. The Debentures and the Common Stock will not be separately transferable prior to November 1, 1960 or such earlier date as the Company may elect.

Price $153.75 per Unit

Copies of the Prospectus may be obtained in any State only from such of the several Underwriters, including the undersigned, as may lawfully offer the securities in such State.

Lehman Brothers — Merrill Lynch, Pierce, Fenner & Smith Incorporated

Blyth & Co., Inc. — The First Boston Corporation — Eastman Dillon, Union Securities & Co.

Glore, Forgan & Co. — Goldman, Sachs & Co. — Harriman Ripley & Co. Incorporated

Kidder, Peabody & Co. — Lazard Frères & Co. — Carl M. Loeb, Rhoades & Co.

Smith, Barney & Co. — Stone & Webster Securities Corporation — Dean Witter & Co.

Bacon, Whipple & Co. — Reynolds & Co.

November 18, 1959.

Dallas and the Fort Worth Star-Telegram, and a contributing editorial writer for The Odessa American.

J. S. (Sid) Pinion forms

J. S. Pinion

. . . Apex Pipe & Supply Co. in Houston to act as oil-country tubular-goods distributors in the Gulf Coast and Mid-Continent areas, including the distribution of specialty pipe and tubing. Pinion, president of the new concern, has been connected with the sale of oil-industry tubular goods and supplies for more than 20 years, having worked for International Supply Co., Bethlehem Steel Supply Division, and Atlas Pipe, Inc.

Associated with Pinion will be T. C. Terrell who has 30-years experience in the industry. For 10 years Terrell was special representative in tubular goods with Bethlehem Steel Supply Division.

Edward G. Crowell is promoted

. . . to assistant vice president and general manager of Macco Oil Tool Co., Inc., Houston manufacturers and international distributors of gas-lift and other production equipment. Locating at the firm's Houston headquarters, he will serve as plant manager and director of purchasing and accounting. Crowell has worked with Macco in various capacities for 8 years. Prior to his employment with the company, he was with Houston Oil Field Material Co. and Reed Roller Bit Co.

Daniel Lee Nicholson is named

. . . production valve salesman representative in the Oklahoma area of Grove Valve & Regulator Co. He will locate at Oklahoma City. Before joining the Oakland, Calif. firm last July, Nicholson was with Movable Offshore Drilling Co. and Daniel Orifice Fitting Co., both in Houston.

Field representatives appointed

. . . by U. S. Steel's Oil Well Supply Division at Houma, La., and at Graham, Tex. D. W. McManus assumes the job at Houma, and Bruce L. Rhea takes over duties at Graham.

Stewart & Stevenson expands

. . . its engineering department, announces E. E. (Slim) Childress. The engineering section, now housed in new Houston quarters, is part of recently acquired property adjacent to the headquarters plant.

H. J. Soileau is promoted

. . . to store manager at Jones & Laughlin Supply Division's Harvey, La., store, announces A. G. Bastian, manager of field operations. Soileau had been employed as storeman advanced at Harvey since 1955. He joined J&L at the Harvey store in 1954 and was later transferred to the division's Houma, La., store.

R. E. Seaton is named manager

R. E. Seaton

. . . of processing and power sales of Wolverine Tube Division of Calumet & Hecla, Inc. He will locate at Allen Park, Mich. The report comes from L. G. Fox, product sales manager. Seaton began with Wolverine as technical sales representative in the New York metropolitan area in 1955. He was assigned to the position of technical sales supervisor 2 years later.

Oliver M. Howard is appointed

. . . general manager of Fritz W. Glitsch & Sons (Canada) Ltd., with general offices and manufacturing facilities in Uxbridge, Ont. The new general manager succeeds Howard W. Reynolds who has been named general manager of the newly organized Glitsch Monterrey, an affiliated company with headquarters in Monterrey, Mexico. Howard has been assistant manager of Glitsch Canada since 1957.

Perrault Supply Co. is formed

. . . as a division of Allied Paint Mfg. Co. to specialize in products for combatting corrosion in pipelines. Ainslie

Ainslie Perrault

V. V. Malcom

Perrault, president of Allied, made the announcement.

V. V. Malcom has been made general manager of the new Allied division. He was made vice president and general manager of Perrault Equipment Co. after it was bought by W. O. Dixon in 1952 and until its purchase by M. J. Crose Mfg. Co. He had also served as engineer and manager of Philip Carey Mfg. Co., Cincinnati manufacturer of asbestos-felt pipe wrap.

Perrault too, has had extensive experience in the pipeline construction field, having been one of the founders of Perrault Brothers, Inc., once a leader in pipe cleaning, priming, coating, and wrapping machines and distributor of pipe wrapping, shielding, and kindred items.

In addition to external coating material, the new firm will handle pipeline felt, rock shield, glass pipe wraps, and internal coatings.

Andreason - Lundberg Corp., New York City, has been named eastern and export representative.

(Continued on page 143)

DISTRICT MANAGERS' CONFERENCE by Republic Supply Co. was held recently at the firm's Oklahoma City general office. Attending the conference were, from left, M. D. Gilmore, Wichita Falls; R. A. Prater, Denver; G. M. McClintic, Oklahoma City; J. F. O'Neill; H. L. Ellis, Odessa; C. J. Jump, general sales manager who presided at the meeting; G. M. Tope, manager of tubular sales; H. G. Huddleston, Wichita; T. P. Nelms, Corpus Christi; J. C. Bergin, Lafayette; H. H. Haire, Salem, Ill.; and R. L. Black, Jr., Amarillo.

Texas A&M will offer advanced drilling courses

TEXAS A&M COLLEGE next semester will offer twin courses of instruction on advanced drilling engineering to personnel in the drilling industry.

The program, sponsored by the college and the American Association of Oilwell Drilling Contractors, is believed the first to offer the industry this level of instruction.

It is designed principally for men with the equivalent of an engineering degree and at least 1 year of experience in the drilling branch of the industry.

The courses will be identical. One running from January 4-15, the other from April 25-May 6.

They will be held at the Memorial Student Center on the college campus and will consist of 80 hours of lectures and supervised computation. Registrants will attend 8 hours a day, 5 days a week.

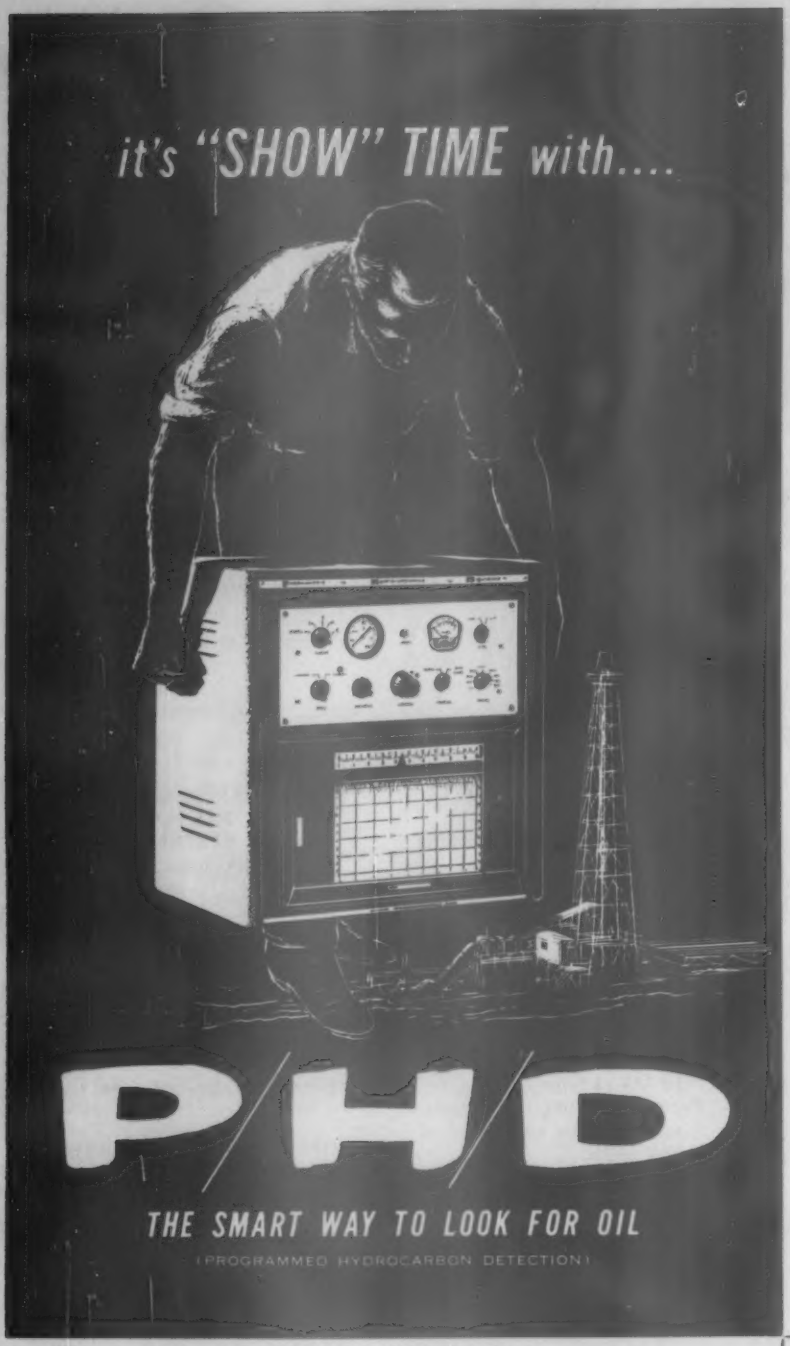
Lecturers will be selected specialists from the industry and members of the faculty of the college's petroleum-engineering department headed by Robert L. Whiting.

Registration for each course will be limited to 20 persons. The fee is $250 per registrant.

As joint sponsor, AAODC, has contributed $2,500 to the college petroleum-engineering department to enable the latter to offer the courses.

Here is schedule of Texas A&M drilling courses:

1. INTRODUCTION (2 hours)
   - Objectives of course.
   - Drilling technology and its future.
2. ROCKS (6 hours)
   - Types.
   - Physical properties and chemical composition.
   - Effect of static and dynamic forces on rock properties.
3. CIRCULATING FLUIDS (8 hours)
   - Types.
   - Physical properties and chemical composition.
   - Static and dynamic characteristics.
   - Control of physical properties and chemical composition.
   - Costs.
   - Present requirements, limitations, and future trends.
4. DRILL STRINGS (8 hours)
   - Types and components.
   - Characteristics of components.
   - Static and dynamic characteristics.
   - Forces and loads imposed on components.
   - Response of components to forces and loads under static and dynamic conditions.
   - Costs.
   - Present requirements, limitations, and future trends.
5. ROTARY DRILLING BITS (7 hours)
   - Types and principle of drilling action.
   - Physical properties and metallurgy.
   - Application to specific hole problems.
   - Costs.
   - Present requirements, limitations, and future trends.
6. CROOKED HOLE PROBLEMS (4 hours)
   - Factors affecting hole deviation and rate of change of hole angle.
7. CONTROLLED DIRECTIONAL DRILLING (4 hours)
   - Methods, tools, and techniques.
   - Present limitations and future trends.
8. FACTORS AFFECTING RATE OF PENETRATION (4 hours)
   - Rock properties.
   - Bit type, weight, and r.p.m.
   - Drilling fluids.
   - Hydraulics.
9. FACTORS AFFECTING HOLE OVERSIZE, SLOUGHING, UNIFORMITY OF WALL, AND DIFFERENTIAL STICKING OF DRILL PIPE (3 hours)
10. DESIGN AND SELECTION OF VARIOUS COMPONENT PARTS OF THE DRILL STRING (4 hours)
    - Physical properties.
    - Metallurgy.
    - Hydraulics.
11. OPTIMUM CONDITIONS FOR ROCK PENETRATION (4 hours)
    - Matching of circulating fluid, drill string and bit properties.
    - Other considerations and factors.
12. OPERATIONS ASSOCIATED WITH DRILLING (8 hours)
    - The drilling rig.
    - Formation evaluation, well completion, and recompletion.
13. DRILLING ECONOMICS (14 hours)
    - Analysis of rig operations and performance.
    - Cost analysis.
    - Total well cost analysis.
    - Trends in contract drilling and drilling costs.
    - Contractor - operator understanding, cooperation, and planning.
14. METHODS OF REDUCING DRILLING COSTS (4 hours)
    - Panel discussion by drilling-industry representatives.



PATENTS APPLIED FOR

Programmed Hydrocarbon Detector ... the hottest thing in mud logging!

Core Lab's new **P/H/D** eliminates the two biggest problems heretofore present in making chromatographic separations of hydrocarbon components—(1) the length of time required to completely "spell out" the heavier hydrocarbons; (2) the low concentrations of heavier hydrocarbons encountered (and the flattening out of heavy hydrocarbon peaks).

For example, **P/H/D** — utilizing an exclusive technique of back-flushing a single column after the desired hydrocarbon has been read — measures methane, ethane, and propane in 1-2-3 sequence (plus heaviers) in *only three minutes!* And, in the meantime, the column is automatically prepared for the next sample.

Heavier hydrocarbons which are normally encountered in low concentration can be grouped together. The width of the composite heavier component peak is compressed by back-flushing, making the peak on the recorder chart *higher and more apparent.* Result—fewer 'lost' shows.

Here, at last, is an electronic system for detecting and selectively analyzing *total gases* in rapid-fire order. And the beauty of it is **P/H/D's** simple put-together — sturdy, compact, dependable.

The Core Lab sales engineer in your area is equipped with **P/H/D** photos and detailed information. Give him a call. You'll be glad you did.

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Caution:

Beware the semantic trap

BY FRANK J. GARDNER

"I KNOW of no other business in which there exists so much prejudice, superstition, and unsound conviction as in the business of exploration for oil."

That frank remark comes from one of the better-known oil finders of the country, George C. Hardin, Jr., president of the Gulf Coast Association of Geological Societies. In his presidential address to the ninth annual meeting of the association in Houston recently, Hardin drew attention to an exploration tool that all oil finders possess, but few know how to use . . . selecting the right word at the right time.

Good words can sell . . . "In order to find good prospects," Hardin said, "the oil finder must control or eliminate his prejudices. Further, he must clarify his thinking in order to understand why he has made the interpretation that results in his decision that he has found a good prospect. His prospect must then be presented in such a way that management will perceive it in the same way he does. Therefore, he must recognize the prejudices of management and avoid having his prospect rejected because the words used in his presentation arouse these prejudices."

In other words, if your boss is anti-Arizona, don't begin your presentation with "The prospective area lies in northern Arizona." Rather, begin with the basic considerations which make the prospect attractive — the structural evidence, probable reservoir conditions, similarity to some prolific producing field. Even the name selected for the prospect can influence management reaction. "If you mention a prospect called West Hastings, or North Old Ocean, or North Seeligson, you will get an immediate favorable reaction," Hardin declared. In presenting your Arizona prospect, then, perhaps you'd be wise to dub it "South Aneth."

And bad words condemn . . . Political boundaries play a big part in management prejudice. "Many areas," Hardin said, "are condemned because of geography and not geology. Mere political boundaries are frequently considered to be the line of demarcation between good and bad oil-producing areas . . . Prior to the discovery of Tinsley field in 1939, the word 'Mississippi' was a 'bad' word to many in oil exploration. 'Alabama' has not yet passed completely from the 'bad' to the 'good' classification, and Georgia and Florida are still 'bad' words."

How many more bad words we can think of today . . . Iowa, Nevada, Idaho. Two years ago, a prospect in Kentucky would have been laughed right out of the office. South Dakota right now is crossing the border from bad to good. As for provinces, how does your boss react to names like "Palo Duro," "Raton," or "Black Mesa"? All are prospective oil regions, disappointing so far but definitely in line for future success.

This minute, we are seeing a prejudice crumble in Utah; "salt anticline" has been a bad word in most exploration offices so far. But Pure Oil Co.'s resounding discovery on the Lisbon anticline (OGJ, November 23, 1959, p. 125) is reversing opinion about such prospects in the Paradox basin. Five years ago, the East Texas piercement salt dome was definitely taboo; today, nearly a third of the 18 domes in that area are on production.

Hardin had some admonitions for the younger geologist, and a few for the older one. To the young oil finder, he cautioned: "Avoid allowing certain terms or words to arouse prejudice . . . Analyze each prospect in terms of lower abstraction, and realize that the names of formations, or any other such general terms, do not mean the same thing each time they are used . . . Watch for signs of prejudice in your supervisors . . . try to avoid arousing them, or try to overcome them."

The older geologist must analyze his technical vocabulary and admit that certain words arouse his prejudice. "Above all, let us not infect the younger geologist with our prejudices," Hardin warned. "We in this group should wake up, take stock of ourselves, and look around for new opportunities for finding oil."

So George C. Hardin, Jr., has hit a tender spot. The oil finder of the future must be aware of the possibilities not only of the structural trap and the stratigraphic trap. He must also keep in mind the hazards that lurk in the semantic trap.

Needed: geologists who can write

"I am convinced, as director of one of the state geological surveys, that great saving would result if a course in scientific writing were required of all geologists during their student days."

BY ALLEN F. AGNEW
State University of South Dakota
State Geologist, South Dakota
Geological Survey

"THE geologist is a scientist in every respect. His professional work after college will require him to do considerable written work, evaluating his decisions in words." John C. McCaslin was thus reminding us in his article, published in March 1954 in The Oil and Gas Journal, of a very important facet of the geologists' professional work. Unfortunately, we geologists are not recognizing the true importance of this facet, or what is worse, we are giving it a mere nod rather than the attention that it really deserves.

As one whose written work has been criticized severely, as a teacher who has attempted to improve the student's awareness of his shortcomings in writing technical reports, and more recently as the director of a state geological survey which must edit these reports before publication, I have become acutely aware of the problem.

After writing the first draft of this paper last spring, it occurred to me that perhaps the problem was not as difficult as I had thought, and that possibly several departments of geology had already solved it to their satisfaction. Accordingly, a letter was sent to 212 departments that grant bachelor's degrees in geology. Of the 120 departments of geology that replied, although all require freshman grammar or composition, and most require one or more courses in literature, only 40 offer a course in the writing of scientific reports. Of those that do offer such a course, few require it for the bachelor's degree; the number rises only slightly with the advanced degree.

In the few schools where the course in scientific writing is taught by the English department, some of the geology departments are so dissatisfied with the course that it is not required for graduation. It seems to me that this assignment of the responsibility to the English department can be satisfactory only if the English instructor is well versed in scientific writing; otherwise, the geology instructor should be expected to contribute measurably to such a course. An alternative is a course taught by the geology department itself. This course of action is likely to bear more fruit, although the English department may rebel at the fancied invasion of its bailiwick.

Many conscientious instructors of field courses work over the report that the student turns in, and thus give him some of the training in writing that he needs so badly. But how few are these devoted instructors, who are willing to take the time (and it really takes a lot of time—far more than most instructors can afford) to do a thorough or even a merely adequate job.

For the rest of us teachers, then, the challenge is out. The geologic profession must work out a program whereby training in scientific writing is required of the geology major.

Suggested approach . . . The course in scientific writing taught by the geology department should include: reading several types of technical articles and examples of company reports, including poorly written, mediocre, and well-written; writing several short papers or reports (1,000-5,000 words); and writing one long paper or report (10,000-25,000 words). The subject matter should be something familiar to the student, because in this course we are attempting to teach him to write, not to turn out an original piece of geologic research. The course should include detailed criticism of the papers by both the instructor and the student. Then the student should rewrite and resubmit his paper.

The student should not be eased too gently into being criticized. Rather, he should be deluged by severe criticism of the type that he will meet, say, when he turns in his thesis or his first company report.

Let us make this criticism as thorough and as shocking as when the poor, unsuspecting geologist sends his first paper to the Geological Society of America, the American Associa-

This is an abridgement of a paper that originally appeared in Journal of Geological Education. It is presented here by special permission of the author and JGE.

tion of Petroleum Geologists, the Society of Mining Engineers of the American Institute of Mining and Metallurgical Engineers, or one of the other societies for publication.

Fewer manuscripts . . . I am convinced, as director of one of the state geological surveys, that great saving in the handling of manuscripts would result if a course in scientific writing were required of all geologists during their student days. Editors of the geological journals will, I am sure, agree with this statement. With the greater number of manuscripts being submitted for publication, and the rising cost of publication, the problem of handling manuscripts is becoming more and more critical.

Many respondents to my letter suggested more essay-type questions rather than the so-called "objective-type" examinations. I cannot jump on this bandwagon too hurriedly. I have used objective questions in my freshman classes because of the ease of grading large numbers of papers by myself, just as some of you have done; at schools where assistants grade the papers, essay questions are more difficult to grade exactly as the lecturer might have graded them. Nevertheless, even beginning students should be given less opportunity to parrot (or copy), and more opportunity to think. In advanced courses essay questions are a must, and the objective-type questions are a never—well, hardly ever (with a nod of course to Gilbert and Sullivan's "Pinafore").

But perhaps the most appalling suggestion of all is for improved scientific writing by the professors! This suggestion, given by more than one geologist, strikes too close to home to all of us teachers. It should remind us of the dentist who owns a mouth full of snaggle teeth and gaps, or of the preacher whose actions are not in keeping with his preaching, or of the geologist who has studied the rocks of a mountain range 1,000 miles away but has "never had the time" to look at the outcrops near his home. If the shoe fits, . . . it pinches, doesn't it?

Teachers, especially thesis supervisors, must first be taught. And for those of us who were not adequately taught we must learn so that we can teach. We should be able to cite examples from our own writing that will fall into each of the three categories—poor, mediocre, and good.

Thus the challenge is out. As a profession we geologists must insist that training in scientific writing be required of geology majors, first, so that they may enhance their positions in the companies for which they work; second, so that editors can better cope with their manuscripts; and third, so that the geologic literature will be full of readable and understandable papers.

PRESIDENTS-ELECT Wayne Glenn (left) of the AIME Society of Petroleum Engineers, and W. J. Garrison of the International Oil Scouts Association confer on plans for their first jointly compiled "International Oil and Gas Development" volume for 1959.

Engineers and scouts will jointly publish annual reviews, statistics

THE International Oil Scouts Association and the Society of Petroleum Engineers of American Institute of Mining and Metallurgical Engineers will jointly publish their annual reviews and statistical records of oil and development in the future.

Their first jointly compiled volume, to be published in 1960, will cover "International Oil and Gas Development in 1959." It will supplant the separate statistical volumes heretofore issued annually by each organization.

The oil scouts now are distributing their Vol. 29, a review of 1958, titled: "Oil and Gas-Field Development in the United States and Canada." The petroleum engineers soon will release their Vol. 13, covering 1958, titled: "Oil and Gas Development and Production."

Combined efforts of the two organizations will produce a two-part volume for 1959. It will list exploratory wells throughout the world, the world's oil and gas production figures by fields, and all other information which each of the organizations has covered in the past. The two-part volume is expected to total 1,400 pages.

Merger of the publications was revealed by William P. Allen, Imperial Oil Ltd., Calgary, president of the oil scouts' association, and John S. Bell, Humble Oil & Refining Co., Houston, president of the Society of Petroleum Engineers. W. J. Garrison, Humble Oil & Refining Co., Houston, will succeed Allen as president of the scouting association during the first year of joint publication. Wayne E. Glenn, Continental Oil Co., also of Houston, will be the new president of the engineering society.

Gathering of data for the joint publication has been in progress throughout the year. Contributors will be petroleum engineers, working under the direction of their society's production-review committee, and oil scouts, working under guidance of their association's executive board and managing editor of publications.

Two Red Cave wells finaled in Panhandle

Two more Red Cave Permian gas wells were added to the growing list of such production in the Texas Panhandle. Two wells are Natural Gas Pipeline Co. of America 101 J. T. Sneed in Section 54, Block B-13, G&M Survey, Moore County, and the 103 J. T. Sneed in Section M-15, N. Jones Survey, 18 miles southeast of Dumas.

The 101 well had a calculated open flow of 840 M.c.f.d. from perforations at 1,543-1,612 ft. Location is 16 miles east of Fourway, Texas.

The 103 Sneed flowed 6 M.M.c.f.d. on calculated open flow gage. Production here was from 1,540-71 ft.

BY WILLIAM T. SMITH
District Editor

Northern California pushes search for gas

SPURRED ON by a combination of no markets for new crude production, plus a steady demand for natural gas, California operators are continuing to turn their attention to the state's northern gas counties.

In addition to the crude and natural-gas marketing situation, a number of other factors were contributing to the current gas search, including:

... **At $65,000** for an average 6,500-ft. dry hole, of $80,000 for a successful well, small operators are attracted by the low costs and ease of drilling.

... **Prices** of 24 to 27 cents and up for gas are not unusual and production finds a ready market with distributors. Some operators making crude discoveries have had to scramble to peddle their production, and more often than not, at prices substantially below postings.

... **Farmouts from majors**, at reasonable terms, are fairly easy to come by. A typical farmout deal calls for a flat 10-12% royalty to the major, or the major can buy back in for half the well, by paying half the costs, at a predetermined depth.

... **A fairly good success ratio** which has seen 22 new fields, pools, or extensions scored out of 72 tries so far this year. However, none of the finds ranks as anything resembling a major discovery. Most are very small one-well deals. One hazard has been the high rate of dry holes in development drilling. The count now shows 59 successful development wells against 21 dry holes.

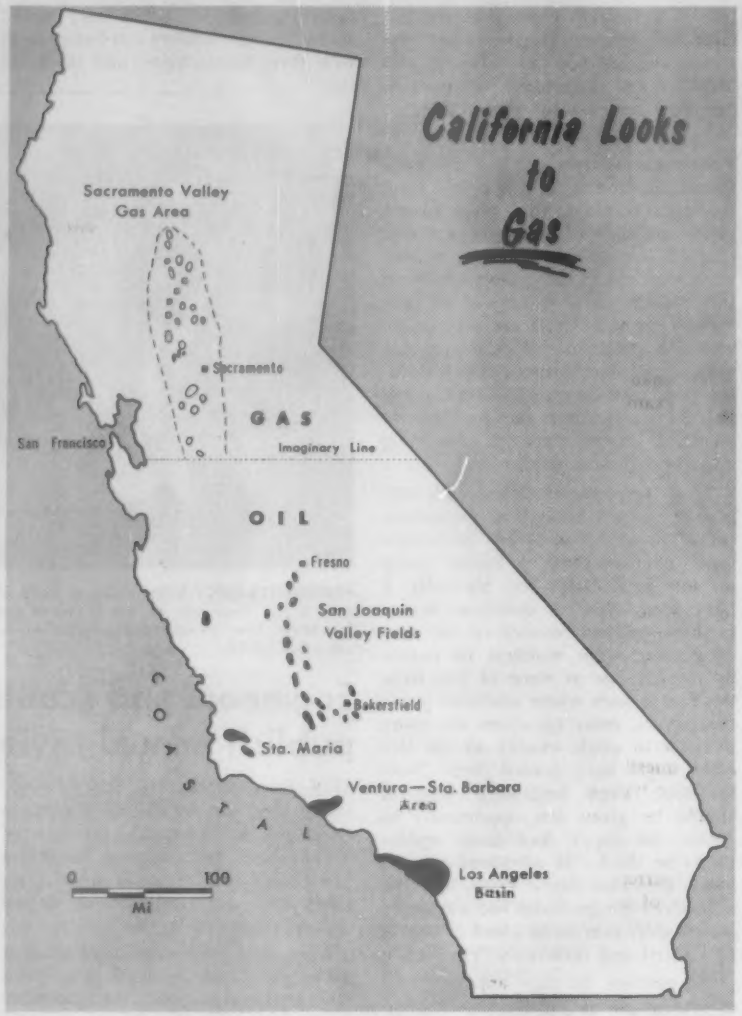
Cretaceous the goal . . . All but an insignificant amount of the state's gas comes from discoveries made in Cretaceous formations.

An interesting feature of the state's geology is that a line can be drawn through the middle of the state, above which only gas is found, and below which only oil is found. This imaginary line would run from the coast, across the southern tip of San Francisco Bay, across Stanislaus County in the valley and into the High Sierras.

Near the line, coming south, the dry-gas Chetaceous formations of the Sacramento Valley disappear, and the highly organic Pliocene, Miocene, Oligocene and Eocene formations of the oil-rich San Joaquin Valley appear.

The Sacramento Valley gas area consists of largely anticlinal formations, gently folding, running in a northwest-southeast trend. The bulk of the gas is found in stratigraphic traps.

A census of drilling so far this year shows Contra Costa County leading in numbers of discoveries with five, all small, followed by Glenn and Sacramento counties with four each. One oddity of the whole situation is that the state's biggest gas discovery this year is probably the Garrison City find by Golden Bear Oil Co. in the middle of Kern County's oil patch. There is a little gas in San Joaquin Valley, but no oil in the Sacramento Valley.



A BIG PUSH to gas-bearing sands is under way in northern California's Sacramento Valley. An imaginary line divides the state's oil areas from its gas production.

Current drilling . . . Following is a rundown on drilling in the gas counties:

... **Butte County.** Standard Oil Co. of California was drilling below 2,270 ft. on a well on the north edge of the Durham field which is on the extreme north edge of Sacramento Valley.

... **Glenn County.** Sunray Mid-Continent Oil Co. was drilling below 6,252 ft. on a closely watched wildcat 2 miles northwest of the nearest producer in the Willows gas field.

In the neighboring Beehive Bend gas field, General Petroleum Corp.

was drilling below 3,596 ft. on a well on the north edge of the field. R. W. McBurney just abandoned a 6,000-ft. wildcat 1½ miles west of the nearest Beehive Bend producer.

... **Colusa County.** The Arbuckle gas field in this county has been attracting the most attention. Pacing the activity is Occidental Petroleum Corp.'s big program on some 34,000 acres farmed out to it by Western Gulf. Occidental has already turned up a couple big wells, dually completed, in the field.

Western Gulf Oil Co. was also active in the area with a wildcat drilling below 8,500 ft. at a site nearly 7 miles east of the Arbuckle field.

Elsewhere in the county, Richard S. Rheem was rigging up for a wildcat southeast of the Bounde Creek field while Standard Oil Co. of California was drilling below 3,275 ft. on a wildcat 6 miles west of the Compton Landing field.

... **Sacramento County.** E. B. Towne was running electric logs in an 8,100-ft. wildcat 10 miles northeast of the Rio Vista field. In the same general area, Standard Oil Co. of California was drilling below 1,000 ft. on an extension test ½ mile west of the nearest producer in the Thornton Gas Field.

... **Yolo County.** Rinde Oil Co. was preparing a drill site for a wildcat in the Capay Canal region about 3 miles north of the small Chickahominy gas field.

... **San Joaquin County.** The Vernalis gas field in this county continues to be one of the more active gas-search areas in the state. Texas Meat Brokerage, Inc., was plugging back its 4,582-ft. extension test on the northwest edge of the field for its second redrill job. In addition, both Standard Oil Co. of California and John M. Young had locations staked for tests in the field.

... **Solano County.** Zephyr Oil Co. was running logs in a 6,300-ft. wildcat midway between the Liberty Cut and Maine Prarie gas fields. In the Maine Prarie field itself, Amerada Petroleum Corp. was drilling below 650 ft. on a well located on the south edge of the field. Shell Oil Co. was preparing to swab a 5,696-ft. well on the east edge of the Kirby Hills field in the same county.

In the Rio Vista gas field, the state's largest, Standard Oil Co. of California was drilling below 5,000 ft. on a well 1 mile north of the field. This test is reportedly slated to be the deepest yet drilled in the area.

... **Contra Costa County.** McCulloch Oil Exploration, Inc., was drilling below 2,073 ft. on a wildcat in the Port Chicago-Los Medanos area.

Sooner drilling spreads over state

Oklahoma developments were widespread throughout the state last week.

• Carter Oil Co. completed a deep dual producer in Southeast New Hope field, Garvin County, in southern Oklahoma. The 1 Moore-Hall, C NW SW 16-4n-3w, flowed 50 bbl. of condensate in 4 hours through ¼-in. choke from open hole at 10,199-10,308 ft. in the Oil Creek Ordovician sand. Calculated open flow was 35,640 M.c.f.d.; from Bromide sand at 9,227-48 ft. and Second Bromide sand at 9,315-16 ft., the well made 102 bbl. of condensate in 6 hours or 408 bbl. per day through 18/64-in. choke. Gas flow was 27,736 M.c.f.d. Calculated open flow was 12,534 M.c.f.d.

Central-South . . . Continental Oil Co. 7 House, SE NW SE 12-1n-7e, Jesse field well in Pontotoc County, flowed 300 bbl. of oil per day from upper Savanna at 1,343-47 ft. and 1,356-67 ft. The well also flowed 117 bbl. per day from lower Savanna at 1,443-49 ft. through ¼-in. choke.

Southeast . . . Another Arkoma basin discovery is Carter 1 Morris in SE SE NW 24-5n-12e, Pittsburg County. The Hartshorne sand Pennsylvanian discovery flowed 2,590 M.c.f.d. from perforations at 3,216-3,378 ft.

Northeast . . . The second well in a new Ellis County field is Sinclair Oil & Gas Co. 1 Woods in C SW NE 11-23n-26w. Flow was 1,635 M.c.f.d. from Morrow Pennsylvanian sand at 8,432-8,522 ft. There was 12 bbl. distillate with the flow.

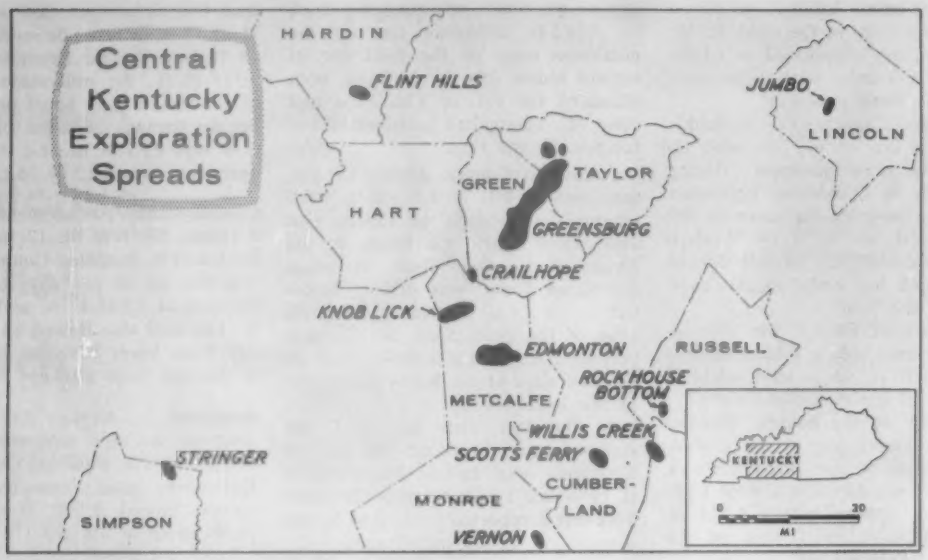
Wildcat hits Mississippian

Chester Mississippian gas production was tapped at a northwestern Oklahoma wildcat. Gulf Oil Corp. 1 Wichert, C SE SW 14-21n-13w, Major County, flowed 5,420 M.c.f.d. on ¾-in. choke from perforations at 7,110-22 ft. Location is 4 miles northwest of the town of Fairview.

Pennsylvania shallow-well completion data—third quarter

County—	Oil Wells	Oil Footage	Gas Wells	Gas Footage	Water input Wells	Water input Footage	Dry Holes Wells	Dry Holes Footage	Storage Wells	Storage Footage	Drilled deeper Wells	Drilled deeper Footage
Alleghany	..	.....	..	.....	..	.....	..	.....	..	5,549	..	.....
Armstrong	..	.....	29	92,394	..	.....	1	3,432	..	.....	2 gas	1,521
Butler	..	.....	..	.....	..	.....	1	2,520	..	.....	..	.....
Clarion	..	.....	8	20,702	..	.....	2	4,004	..	.....	..	.....
Clearfield	..	.....	1	1,507	..	.....	..	.....	..	.....	..	.....
Clinton	..	.....	..	.....	..	.....	1	1,287	..	.....	..	.....
Elk	..	.....	4	8,881	..	.....	..	.....	..	.....	..	.....
Forest	5	5,946	3	4,579	..	.....	2	2,789	..	.....	..	.....
Indiana	..	.....	4	14,145	..	.....	..	.....	..	.....	1 gas	2,243
Jefferson	..	.....	5	15,840	..	.....	..	.....	..	.....	1 gas	1,704
McKeorn	53	97,058	2	4,562	32	64,573	..	.....	..	.....	1 oil	139
Mercer	..	.....	..	.....	..	.....	1	764	..	.....	..	.....
Tiaga	..	.....	1	1,500	..	.....	..	.....	..	.....	..	.....
Venango	2	2,238	..	.....	..	.....	1	485	..	.....	..	.....
Warren	2	2,265	..	.....	..	.....	..	.....	..	.....	..	.....
Washington	..	.....	3	8,210	..	.....	3	4,943	..	.....	..	.....
Westmoreland	..	.....	6	18,785	..	.....	5	18,807	..	.....	..	.....
Total	62	107,507	66	191,105	32	64,573	17	39,031	3	5,549	5	5,607

Total new wells—177
Total footage of new wells—402,216 (excl. storage)
Total footage of all wells—413,372



THE SEARCH for shallow oil production in Central and South Kentucky spreads in all directions. A southward push toward and over the Tennessee line is anticipated.

Kentucky oil search reaches into 14 more counties

EXPLORATION in Central Kentucky has spread from Green County to the surrounding counties of Taylor, Larue, Hart, and Metcalfe; northwest to Hardin County; southwest, south and southeast into Barren, Allen, Simpson, Warren, Monroe, Cumberland, Russell, and Clinton counties; and northeastward to Lincoln County.

Activity in Greensburg pool, the pool that sparked the shallow central play, is limited to a northeastern extension in Taylor County. This pool is yet to be defined at the northeast end. Fourteen rigs are engaged in development drilling in this area.

Production . . . Greensburg pool produced 21,700 bbl. per day from 2,144 wells during October. Listed below is the number of wells, production, and counties from which Ashland Oil & Transportation Co., purchased oil during the month of October 1959:

County	Wells	Barrels
Green	2,046	526,379
Taylor	98	155,164
Metcalfe	37	43,525
Cumberland	5	787
Hardin	17	3,172
Hart	8	133
Russell	2	543
Totals	2,214	729,703 bbl.

The rapid increase of production in Taylor County is due to wells which had very little if any production during September because they were pumping mostly salt water. Since this time several wells have come on oil and had production as high as 300 barrels per day per well. To handle this increase in production, Ashland Oil & Transportation Co., has laid 16,000 ft. of 4-in. and 6,000 ft. of 3-in. line pipe in Taylor County during October. Ashland gathering system in the Green County pool now extends to Route 210, well into Taylor County. Total gathering system in this pool includes 103 miles of 2, 3, and 4-in. line pipe with 46 pumps and motors.

Crailhope Pool

Six miles southwest of Greensburg pool, still in Green County, in Section 21-I-46 and surrounding sections, Crailhope pool is being developed. Oil produced from a dolomite zone immediately below the New Albany black shale. Most operators believe this to be the Laurel dolomite "blue sand" of Silurian age. There are now 10 rigs running in this pool, concentrated in 21-I-46. Well depths are between 550 and 600 feet. This pool is presently producing 400 bbl. per day from 27 wells.

Knob Lick Pool

Five miles southwest of Crailhope pool in Sections 18, 19, 22, 23, and 24-H-46, Metcalfe County Knob Lick pool is being developed. Production is spotty, reportedly coming from an unidentified sandstone immediately below the New Albany black shale. Operators are calling the pay horizon Corniferous sand.

Jumbo Pool

This pool is located in Lincoln County in the northern center of Carter Coordinates L-58. Wells in this pool range from 80 to 300 ft. in depth where the Corniferous pay is found. Present production of the pool is 500 bbl. per day from 32 wells. Lease operators in this pool are reworking old wells as well as completing new ones in hopes of increasing their present production. There are twelve drilling rigs in this immediate area.

Scotts Ferry Pool

This newly opened small pool in Cumberland County is located in Carter Coordinates 10-D-50. Wells in this area are 750 to 850 feet in depth and the pay formation has not been identified, as production in this pool is 100 barrels per day from three wells on three leases which are operated by Kentaco Oil & Gas Co., Joe Mesalom, and Hunt Oil Co. Activity in this area has decreased, although four rigs are in this area.

Rock House Bottom

In Carter Coordinates 17-E-52, 13-E-52, and 9-E-52, in Russell County seven wells can be found extending this old pool. The pay is in the Sunnybrook at a depth of 400 to 500 feet. Total production from these wells is 20 barrels per day. Several rigs are working in this vicinity.

Willis Creek Pool

Located in Clinton County in Carter Coordinates 5-7-13-D-52, production is 200 barrels per day from 23 wells. The pay is the Granville formation. This is considered to be an old pool. Operators are trying to find new production in this area, however.

Flint Hill Pool

Flint Hill pool in Hardin County located in Carter Coordinates 16-23-24-25-M-42 and 43. Seventeen wells are in this pool at a depth of 800 to 1,000 feet when the pay is found in the Corniferous lime. Daily production in this area is 100 barrels per day. Activity in this area has decreased, although four rigs are in this area.

Vernon Pool

Vernon pool is located in Carter Coordinates 2, 3, 8, 9, B-48 in Monroe County. Wells range from depths of 800 to 1,000 feet where the pay is reportedly found in the limestone of Stones River age. Two wells are in this general vicinity with a daily production of 100 barrels per day. Several old wells may be found in this area, but very few are still producing.

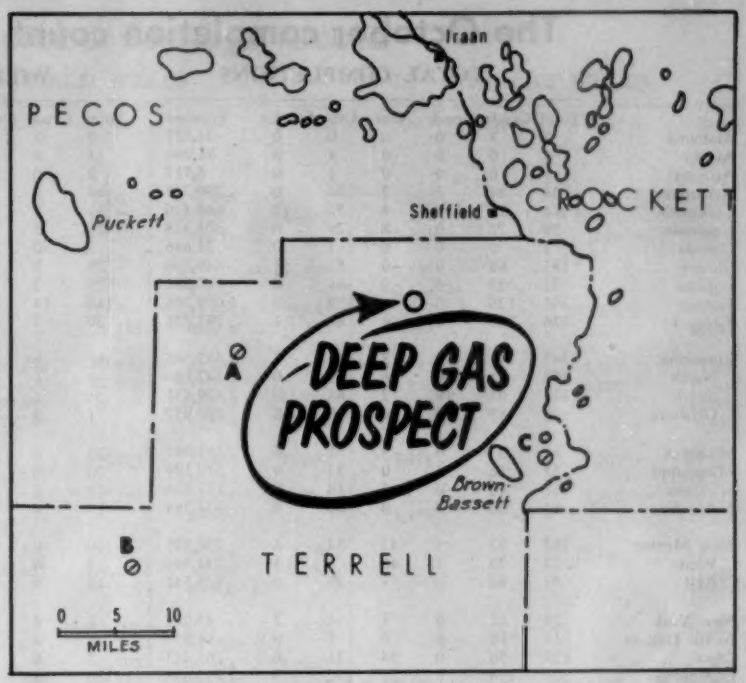
Edmonton Pool

Edmonton pool is located in Metcalfe County, Carter Coordinates 6,7,8-F-48, 14-15-16-17-F-48. Approximately 12 producing wells are found in this area with a daily production of 600 barrels per day. The pay is in the Fort Payne lime at a depth of 250 to 300 ft.

Stringer Pool

Located in Simpson County Carter Coordinates 21-D-37 and 38, a new well was brought in on the Arthur Slade farm by Linehan & Stoltenberg-Amtexas (OGJ, Oct. 12, 1959). This well flowed 1,200 bbl. the first week but has leveled off and is pumping 30 barrels per day. The play in this area is from the Laurel formation with TD of 498 feet.

There are 60 wells in the area 2 miles southeast of this well in East Simpson County extending into west Allen County. These wells are making a total of 70 bbl. daily from the Laurel dolomite. Several of these wells were drilled to the same depth as the Slade well but the formation differed in the two areas and no pay was present in the former at this depth. This well is 2 miles from the Spinger beaver wells which were reported to be heavy producers years ago. There was no water in the Slade well until it was put on pump. Then it made three-fourths salt water to one-fourth oil for 2 days and nights then went to two-thirds oil to one-third water.



NEWEST PROSPECT for the deep Val Verde basin area of West Texas is Humble Oil & Refining Co. 1 Annie Spencer, in northwestern Terrell County. The well made a good flow of gas from the Strawn. Current deep exploration in the county is as follows: (A) Mobile Oil Co. 1 Drummond (Corder on some maps), scheduled to 17,000 ft., drilling below 3,130 ft. (B) Gulf Oil Corp. 1 McCue, recently dry at total depth 18,500 ft. (C) Three States Natural Gas Co. 1 Banner Unit, scheduled to 14,600 ft. as a Brown-Bassett field extension, shut in at 6,300 ft., total depth.

Texas wildcat flows Strawn gas

A WILDCAT in northwestern Terrell County, West Texas, flowed gas at the rate of 15 M.M.c.f.d. from the Pennsylvanian Strawn section. On the basis of this test, the well is the best discovery prospect since big gas reserves were found in the Devonian, Silurian, and Ellenburger formations at Brown-Bassett field, some 15 miles to the southeast.

The Strawn prospect is Humble Oil & Refining Co. 1 Annie Spencer, 10 miles southwest of Sheffield, in Section 68, Block B-2, CCSD&RGNG Survey.

No. 1 Annie Spencer was scheduled to 14,100 ft. as an Ellenburger wildcat. When operators halted drilling at 11,330 ft., the well started making gas. Placed on ¾-in. tubing choke, the project flowed gas at the estimated rate of 15 M.M.c.f.

Operators then cored ahead, recovering a few feet of lime and chert, with gas shows. A drill-stem test at 11,358-11,409 ft., open 1 hour, recovered the water blanket and 1,000 ft. of gas in drill pipe. Drilling then continued and the bit was below 11,418 ft. at last report.

No. 1 Annie Spencer is 1¼ miles southwest of Humble's 1 Blackstone, which in 1953 was drilled to the Devonian at 12,160 ft. before being plugged back to 3,751 ft. for completion as a small Wichita Albany (lower Permian) gas discovery. The well was not produced, nor were there further tests to the gas pay around 3,400 ft.

Wyoming gets strike

GREEN RIVER BASIN'S sudden flourish of Almond Cretaceous oil exploration bagged its best strike yet at El Paso Natural Gas Products Co. 1 Patrick draw Unit in 1-18n-99w, Sweetwater County, Wyoming.

First gage was 647 bbl. of oil per day on ¾-in. choke from perforations between 5,182 and 5,198 ft. Testing continues. This discovery is 7 miles south of the recent important strike at West Desert Springs, a Texas National Petroleum Co. Almond discovery. El Paso is waiting on cement after setting pipe at 2 Patrick Draw Unit in 11-18n-99w.

The October completion count in the U. S.

	TOTAL COMPLETIONS							WILDCAT WELLS							
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	Act. op.
Alabama	3	3	0	0	0	0	34,582	0	0	0	0	0	0	0	4
Alaska	1	0	0	0	1	0	11,080	1	0	0	0	1	11,080	0	3
Arizona	1	0	0	0	1	0	6,917	1	0	0	0	1	6,917	0	5
Arkansas	81	44	0	3	34	0	290,205	14	1	0	0	13	56,218	0	120
California	144	72	0	8	52	12	686,426	35	1	0	3	31	166,713	1	97
Colorado	59	22	0	8	29	0	305,338	23	3	0	1	19	132,882	0	114
Florida	1	0	0	0	1	0	11,646	1	0	0	0	1	11,646	0	2
Illinois	193	60	0	0	82	51	449,230	29	3	0	0	26	57,897	13	401
Indiana	71	23	0	0	48	0	103,581	25	2	0	0	23	38,168	52	89
Kansas	302	126	0	14	159	3	1,059,786	114	14	0	11	89	422,229	4	398
Kentucky	376	285	0	4	86	1	297,775	50	7	0	0	43	56,994	350	239
Louisiana	342	143	29	18	149	3	2,533,268	51	2	0	1	48	422,290	0	407
North	152	65	0	16	71	0	542,880	27	1	0	1	25	147,214	0	148
South	152	63	19	2	68	0	1,609,431	23	1	0	0	22	265,090	0	202
Offshore	38	15	10	0	10	3	380,957	1	0	0	0	1	9,986	0	57
Michigan	61	21	0	3	31	6	195,047	25	1	0	2	22	82,773	18	178
Mississippi	53	16	4	0	33	0	510,199	20	0	0	0	20	178,256	0	57
Montana	31	10	0	3	18	0	117,834	11	0	0	1	10	59,436	1	69
Nebraska	62	26	0	0	36	0	374,364	27	6	0	0	21	166,033	0	68
New Mexico	168	82	5	43	34	4	750,385	19	0	0	1	18	81,384	41	290
West	77	20	5	40	8	5	334,843	4	0	0	0	4	11,189	9	182
East	91	62	0	3	26	0	415,542	15	0	0	1	14	70,195	32	108
New York	23	12	0	3	1	7	43,011	1	0	0	0	1	10,438	22	21
North Dakota	15	10	0	0	5	0	94,959	0	0	0	0	0	0	0	35
Ohio	127	56	0	34	31	6	265,453	1	0	0	0	1	3,351	125	216
Oklahoma	325	154	3	31	132	5	1,325,026	50	8	0	6	36	279,888	32	651
Pennsylvania	82	16	0	29	20	17	252,529	9	0	0	2	7	43,584	79	61
South Dakota	3	0	0	0	3	0	18,682	3	0	0	0	3	18,682	0	10
Texas	1,451	757	62	96	498	38	6,274,628	264	6	2	12	244	1,243,883	71	1,127
Dist. 1	93	36	3	1	53	0	270,109	38	0	0	0	38	125,934	0	43
Dist. 2	73	21	9	7	36	0	509,240	22	0	0	2	20	180,326	0	49
Dist. 3	103	36	11	2	54	0	633,774	17	0	2	0	15	138,330	0	104
Dist. 4	120	33	18	24	45	0	701,617	21	0	0	0	21	127,959	5	95
East	123	77	7	3	35	1	414,693	21	2	0	0	19	86,803	0	66
Dist. 7-B	187	77	2	4	103	1	554,684	55	2	0	3	50	184,735	0	86
West	368	266	3	14	66	19	1,932,399	45	0	0	6	39	217,336	16	433
Dist. 9	290	157	2	22	92	17	848,822	38	1	0	1	36	145,749	50	108
Dist. 10	94	54	7	19	14	0	409,290	7	1	0	0	6	36,711	0	143
Utah	19	12	0	0	7	0	110,032	6	1	0	0	5	37,133	0	41
Washington	1	0	0	0	1	0	6,650	1	0	0	0	1	6,650	0	2
West Virginia	64	5	0	52	7	0	170,765	3	0	0	2	1	14,149	60	211
Wyoming	56	18	0	4	31	3	314,786	27	1	0	2	24	174,320	3	165
Total Oct. 1959	**4,115**	**1,973**	**103**	**353**	**1,530**	**156**	**16,614,184**	**811**	**56**	**2**	**44**	**709**	**3,782,994**	**872**	**5,081**
Total Sept. 1959	4,588	2,067	122	372	1,868	159	19,590,037	1,024	67	7	42	908	4,717,798	737	5,086
Cum. 1959	41,935	20,797	1,030	3,142	15,786	1,180	174,080,487	8,202	730	93	281	7,098	39,826,331	7,517	....
Cum. 1958	39,990	19,610	927	3,041	15,377	1,035	163,083,416	7,962	771	134	220	6,837	37,111,895	....	....

Note: C.T. = Cable Tool Comp. D.D. = O.W.D.D. Act. Op. = Active Operations.
D.D. = 32: Kans. 4, Ill. 4, Ky. 2, Okla. 7, N. M. 2, Tex. (10) 2, Calif. 2, Ind. 3, Tex. (4) 3, Tex. (3) 2, Tex. (2) 1.

. . . and in Canada

	TOTAL WELLS							WILDCATS					
	Total	Oil	Gas	Dry	Service	Footage	Cum. 1959	Total	Oil	Gas	Dry	Footage	Cum. 1959
Western Canada	**194**	**101**	**27**	**55**	**11**	**1,070,601**	**2,037**	**40**	**6**	**6**	**28**	**259,345**	**560**
Alberta	156	80	24	41	11	892,157	1,285	33	6	6	21	222,948	326
Saskatchewan	28	18	0	10	0	115,281	636	5	0	0	5	19,192	173
Manitoba	1	1	0	0	0	2,125	33	0	0	0	0	0	7
British Columbia	9	2	3	4	0	61,038	79	2	0	0	2	17,205	50
Northwest Territories	0	0	0	0	0	0	4	0	0	0	0	0	4
Ontario	41	4	15	17	5	54,918	242	..	..	..	..	.....	...

Deep Wildcat Set for Texas' Hunt County

Material was being trucked in last week to drill a 10,000-ft. Smackover wildcat in southern Hunt County, East Texas.

Sunray Mid-Con inent Oil Co. was building roads and clearing location for its 1 J. W. Barrow, 4 miles southeast of Quinland, in the Lucius B. Polk Survey, A-829. M. J. Delaney Drilling Co. holds contract.

Nearest deep test in the area to furnish subsurface information was Humble Oil & Refining Co. 2 R. N. Moody, about 5 miles to the southwest, in Kaufman County. Humble's well drilled to 10,195 ft. and had no shows. On elevation of 584 ft., 2 Moody had top Smackover 9,720 ft.

October footage record

	FIELD WELLS					WILDCAT WELLS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	34,582	.....	.....	.....	.....	.....	.....	.....	.....
Alaska	.....	.....	.....	.....	.....	.....	.....	.....	11,080
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	6,917
Arkansas	127,889	.....	15,058	91,040	.....	3,000	.....	.....	53,218
California	337,637	.....	21,298	111,086	49,692	7,992	.....	13,821	144,900
Colorado	87,137	.....	37,103	48,216	.....	17,103	.....	5,800	109,979
Florida	.....	.....	.....	.....	.....	.....	.....	.....	11,646
Illinois	137,581	.....	.....	137,237	116,515	7,595	.....	.....	50,302
Indiana	31,716	.....	.....	33,697	.....	2,180	.....	.....	35,988
Kansas	361,139	.....	17,101	249,472	9,845	55,982	.....	55,490	309,757
Kentucky	183,871	.....	9,580	46,978	352	8,783	.....	.....	48,211
Louisiana	877,161	386,232	79,020	761,285	7,280	14,882	.....	10,310	397,098
North	158,612	.....	64,916	172,138	.....	5,800	.....	10,310	131,104
South	574,241	259,483	14,104	496,513	.....	9,082	.....	.....	256,008
Offshore	144,308	126,749	.....	92,634	7,280	.....	.....	.....	9,986
Michigan	63,444	.....	4,277	28,463	16,090	3,978	.....	7,207	71,588
Mississippi	172,057	43,735	.....	116,151	.....	.....	.....	.....	178,256
Montana	30,698	.....	5,569	22,131	.....	.....	.....	2,780	56,656
Nebraska	118,744	.....	.....	89,587	.....	38,158	.....	.....	127,875
New Mexico	349,596	32,852	202,085	80,218	4,250	.....	.....	12,262	69,122
West	79,480	32,852	196,162	10,910	4,250	.....	.....	.....	11,189
East	270,116	.....	5,923	69,308	.....	.....	.....	12,262	57,933
New York	15,252	.....	8,001	.....	9,320	.....	.....	.....	10,438
North Dakota	63,589	.....	.....	31,370	.....	.....	.....	.....	.....
Ohio	111,404	.....	82,797	49,454	18,447	.....	.....	.....	3,351
Oklahoma	547,602	25,865	143,419	317,423	10,829	48,485	.....	44,129	187,274
Pennsylvania	29,162	.....	115,918	37,660	26,205	.....	.....	6,673	36,911
South Dakota	.....	.....	.....	.....	.....	.....	.....	.....	18,682
Texas	2,941,477	505,108	453,017	1,020,294	110,849	26,632	23,903	45,478	1,147,870
Dist. 1	86,778	19,111	3,299	34,987	.....	.....	.....	.....	125,934
Dist. 2	123,162	79,261	33,401	93,090	.....	.....	.....	10,265	170,061
Dist. 3	142,443	100,595	9,560	242,846	.....	.....	23,903	.....	114,427
Dist. 4	150,933	149,538	147,847	125,340	.....	.....	.....	.....	127,959
East	214,256	51,051	13,875	46,716	1,992	11,690	.....	.....	75,113
Dist. 7-B	219,651	7,488	3,750	134,883	4,177	6,665	.....	7,846	170,224
West	1,397,138	26,345	84,572	140,020	66,988	.....	.....	22,351	194,985
Dist. 9	382,475	11,863	105,838	165,205	37,692	5,427	.....	5,016	135,306
Dist. 10	224,641	59,856	50,875	37,207	.....	2,850	.....	.....	33,861
Utah	61,353	.....	.....	11,546	.....	8,552	.....	.....	28,581
Washington	.....	.....	.....	.....	.....	.....	.....	.....	6,650
West Virginia	9,766	.....	132,845	14,005	.....	.....	.....	7,086	7,063
Wyoming	76,118	.....	14,505	39,023	10,820	3,931	.....	17,421	152,968
Total U. S.	**6,768,975**	**993,792**	**1,341,593**	**3,336,336**	**390,494**	**247,253**	**23,903**	**229,457**	**3,282,381**
Western Canada	530,058	.....	77,714	143,164	60,320	43,892	.....	50,377	165,076
Alberta	442,025	.....	59,813	107,051	60,320	43,892	.....	50,377	128,679
Saskatchewan	77,562	.....	.....	18,527	.....	.....	.....	.....	19,192
Manitoba	2,125	.....	.....	.....	.....	.....	.....	.....	.....
British Columbia	8,346	.....	17,901	17,586	.....	.....	.....	.....	17,205

Permian prospect tests in Texas Panhandle

There are indications of another Permian gas discovery in central Roberts County in the Texas Panhandle, 15 miles north of the town of Miami.

Production is indicated in the brown dolomite at James G. Brown & Associates 1 R. L. Flowers on the Clay County School Land Survey. Nearest production of the same sort is at Cree-Flowers field 2½ miles south, but the two areas are separated by previous failures. The new prospect flowed 1,250 M.c.f.d. on tests.

Other finds . . . Mobil Oil Co. finaled 3 Olive T. Jones to open a new oil area on the northeast flank of Feldman Tonkawa gas field in northeastern Hemphill-southeastern Lipscomb County.

This Pennsylvanian well pumped 66 bbl. of oil per day from perforations at 7,606-16 ft., 7,623-26 and 7,640-52 ft. in Tonkawa. Location is 4 miles northeast of nearest oil production in the field. Spot is in Section 83, Block 43, H&TC Survey, 11 miles northeast of Glazier.

Morrow oil production was opened at Stekoll Petroleum Corp. 1-28 Knox Pipkin in Section 28, Block JT, AB&M Survey, 14 miles south of Farnsworth in Ochiltree County. Tests continue at the well which lies 5 miles south of nearest Morrow production at RHF field. It flowed 126 bbl. of new oil in 24 hours from Morrow perforations below 8,137 ft.

George Morrow-East Camrick oil field was also extended by Stekoll at 1-13 Enfield-Mason in Section 13, Block Z, S. H. King Survey, 7 miles north of Perryton. Gage from the upper zone was 735 bbl. of oil in 13 hours from Morrow, but no gage was reported on the lower Morrow zone.

New fault block for California

An extension test on the north edge of the Stenderup area of Mountain View field, Kern County, was credited with being a possible new fault-block

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You have three good reasons for calling your J&L Supply man when considering a waterflood program.

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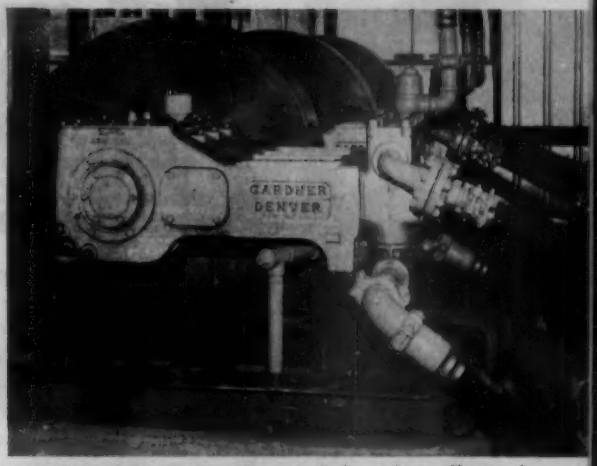
84

J&L's waterflood engineering team plans for efficiency and economy in flood operations.



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discovery. The well, 1 Hunter-Brite, found Jewett sand production at 8,264-8,444 ft. On a 12-hour test, it flowed at a rate of 432 bbl. daily of 33.7°-gravity crude through an 18/64-in. choke. The well is a westerly offset to Union Oil Co. of California's new lower Miocene (Jewett) pool discovery made last December.

California's Durham extension successful

Gas production in Butte County's Durham gas field near Chicago was extended successfully by a wildcat in NE NE 6-20n-1e drilled by Standard Oil Co. of California.

The well, 1 T. W. Rodgers, is located ½ mile northeast of the Donahue area and ¾ mile south of the Wahl producers. It was completed for 2,800 M.c.f.d. through a ⅜-in. choke.

Tulare Lake bed test spudded in California

The Tulare Lake bed, once considered California's largest lake when at flood stage, is the site of a wildcat spudded in by Tidewater Oil Co.

Tidewater chose a site on the east shore of the largely dry lake for its 11,000-12,000-ft. test. The company has a block of leases comprising 8,000 acres west of the town of Corcoran and north of the Trico gas field in Kern County.

Deeper pool seen for Pleito Ranch in California

Shell Oil Co. returns to the Pleito Ranch field-discovery well in southern Kern County, and redrilled it for a probable deeper pool discovery. The well was originally completed in a nonmarine Etchegoin sand between 11,272-11,674 ft. for 105 bbl. daily of 22.8° gravity production 2 years ago. In October of this year, it was cleaned out to 11,750 ft., whipstock was set, and is being redrilled below 13,282 ft. Shell ran a drill-stem test on an interval at 12,896-13,081 ft. which recovered 4,641 ft. net of gassy, muddy oil after being open 2 hours. The oil rated at 26° gravity.

This area is about 6 miles southeast of the San Emidio Nose field.

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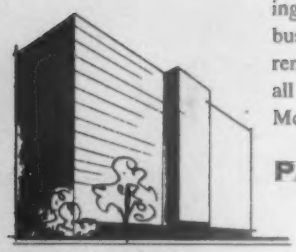

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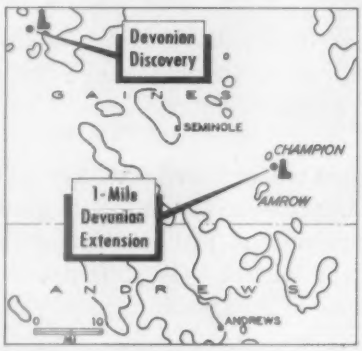


MAJOR Devonian extension is shaping up in West Texas with new Permian basin discoveries.

Texas' Permian adds third straight strike

EXPLORERS in the Permian basin area of West Texas and Southeast New Mexico have completed the third Devonian discovery in recent weeks, and have a major Devonian extension in prospect. The latest completed pool opener, plus the extension test, are in Gaines County, Texas.

New Devonian production in the northwest corner of Gaines County has been established by Texaco Inc. 1 M. S. Jones, NCT-1, in Section 3, League 302, Terry CSL Survey. On potential test from open-hole section at 11,100-15 ft., the well flowed 361 bbl. of 42° oil a day through 22/64-in. choke.

Nearby production also is in the

Devonian. No. 1 Jones is approximately 2 miles northwest of Russell field, and 2½ miles southeast of Jones Ranch field.

Major extension . . . Champlin Oil & Refining Co. and W. A. Moncrief 1 Will P. Edwards Estate, in southeastern Gaines County, reported good oil recovery on drill-stem test of the Devonian.

A 2-hour test at 12,748-58 ft. developed 250 ft. of oil on top, 1,532 ft. of mud-cut oil, and 400 ft. of free oil on the bottom. Flowing pressure varied from 1,750-1,865 psi., and shut-in pressure reached 5,458 psi. in 30 minutes. Operators ran 5½-in. casing for completion attempt.

Formation markers in the Edwards were: Upper Mississippian 11,705 ft., Lower Mississippian 12,198 ft., Woodford 12,663 ft., and the Devonian at 12,746 ft. Ground elevation is 3,148 ft.

No. 1 Edwards is 1⅛ miles south and slightly east of Champion's 1 Higginbotham, opener of Champion-Devonian field in May 1959. Potential was 718 bbl. of oil a day through ¼-in. choke, from pay at 12,737-50 ft.

New Mexico completion . . . Pure Oil Co. has reported completion potential on its Devonian opener in Lea County, New Mexico, in the Cross Roads area. Flowing through 24/64-in. choke, the well gaged 313 bbl. of 44° oil in 6 hours, to give it a daily rate of 1,252 bbl. Production was from perforations at 12,003-23 ft. Location is 3 miles southwest of Cross Roads-Devonian field, in 31-9s-36e.

East Ohio reports new Clinton pool

In Ohio's southeast Lawrence Township, Stark County, East Ohio Gas Co. reported indications of a new pool on completion of 1 G. C. Lindsey, Section 36.

The Clinton sand was drilled in wet at 4,186-4,237 ft. and fractured to 572 M.c.f.d. with a rock pressure of 1,260 psi.

A westward followup of this test is now being drilled by the same operator.

E. J. McBride moved across the township line and completed 1 F. N. Jones, Tract 3, Lafayette Township, Medina County, as the first offset to pool opener, 1 M. H. Henning, Section 12, Westfield Township.

The Clinton sand was logged at 3,091-3,100 ft. and gaged 42 M.c.f.d. natural and 2,085 M.c.f.d. after fracture with a rock pressure of 925 psi.

A successful northern extension of Jefferson pool in Plain Township, Wayne County, was reported by the operator, John Richmond, to have gaged 100 bbl. oil per day and 1,970 M.c.f.d. of gas after fracture.

The test, 1 James Anderson, Section 12, logged the Clinton sand at 3,242-3,305 ft. and had 10 bbl. oil and 360 M.c.f.d. natural.

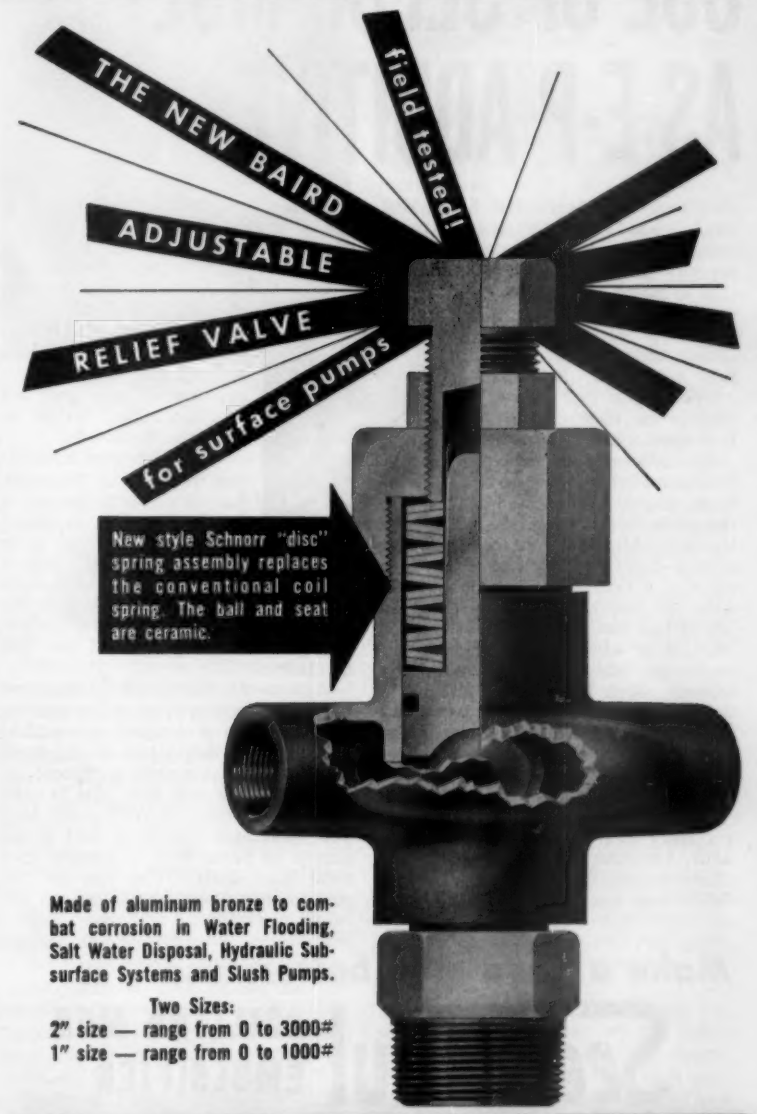
Arkoma gets three wildcats

Arkoma basin exploration gained three new wildcats in southeastern Oklahoma last week. Bell Oil & Gas Co. will drill one in McIntosh County at 1 Roork, C SE SE 17-11n-17e. It will go to 1,950 ft. to the basal Atoka Pennsylvanian. Location is north of Checotah gas field.

The 1 Rooks in NE SW NE 7-5n-12e will be a northeast offset to a shallow gas discovery in SE SE SW Section 7 where Boggy sand produced. The Rooks well will go to 1,900 ft. The 1 Fargo in NW SE SE 12-5n-11e, ½ mile west of production, will go to 3,250 ft., to the Hartshorne.

Texas well hits second try

Following up a blowout in its first test, junked and abandoned at 9,666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The efficiency of Seeco-Mul as an E-P agent is due to its chemical structure—the ability of one end of the Seeco-Mul molecule to adhere tightly to a metal surface, attracting another molecule to form the familiar micelle, or the joining of two molecules at opposite ends. This layer attracts other Seeco-Mul molecules, which build up to an extremely tough lubricating film that is difficult to remove and will withstand high pressure, successfully reducing metal-to-metal contact and subsequent wear, or galling, of the bearing surfaces.[1]

In addition to the E-P qualities, you get many other advantages with Seeco-Mul. Inasmuch as Seeco-Mul is a chemical emulsifier with superior wetting abilities, it is often run in so-called "soap" drilling fluids (the addition of detergents to fresh water muds, oil-and-water, and water-clay systems) to lower the surface tension, thereby wetting the formation ahead of the bit and keeping the bit clean. Such systems also afford a faster penetration rate and aid the suspended solids to drop out in the pits.

Too, with good lubricating qualities in the mud, less drill stem torque is required, pump pressures can be lowered and more evenly sustained, and a higher velocity of the fluid on bottom can be obtained . . . all of which means longer service life for liners, collars, tool joints, drill pipe, and the bits themselves.

Add to this the longer bit runs and the consequent savings in bits and rig time and you will agree that adding Seeco-Mul to the system is an investment rather than a drilling expense.

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[1] *McCutcheon, John W., "Synthetic Detergents."*

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CROSSETT **Seeco-Mul** **DRILLING MUD EMULSIFIER**

Manufactured by the Chemical Division of The Crossett Company, Crossett, Arkansas

Seeco-Mul is the dried flake form of a compound of the sodium salts of abietic, linoleic, and oleic acids, together with quantities of wood tannins and lignins.

ft., Olin Oil & Gas Corp. has completed a good gas-condensate well in its second venture, 2 Rudolph Weiss, on a wildcat prospect 15 miles east of downtown Houston in eastern Harris County, Texas Gulf Coast.

The new discovery well is productive from a 10,600-ft. sand, perforated at 10,620-10 ft., from which it tested 3,900 M.c.f.d. of gas through 12/64-in. choke, recovering 50 bbl. of condensate per 1 M.M.c.f. Flowing pressure is 3,500 psi. Shut-in bottom-hole pressure is 6,420 psi.

The discovery is 3 miles west of Highlands. Nearest production is 9 miles northwest at Dyersdale.

Illinois takes drilling spotlight

ILLINOIS took all of the oil news from other Illinois basin states last week with important developments reported in Jasper, Clay, Crawford, White, and Brown counties.

In Jasper County, 7 miles south of Newton in SW NW SE 13-5n-9e, Mt. Carmel Drilling Co. is swab-testing in Rosiclar at 2,958-61 and McClosky at 2,978-81 ft. at the 1 Rush Parnell.

The well swabbed 8 bbl. of oil per hour, natural, from McClosky, and 3 bbl. per hour, natural, from Rosiclair.

Clay County's discovery is Francis M. Pierce 1 Earl Stanley in NE NW SE 1-4n-7e, 3 miles north of Sailor Springs. A drill-stem test in McClosky at 2,904-15 ft. flowed oil. Casing has been set to test at 2,911-15 ft.

In Crawford County, 2 miles southwest of Robinson, L. S. Rister 1 Nicholas Novosel, NW NE SW 8-6n-12w, swabbed and flowed 60 bbl. of oil in 4 hours from Aux Vases at 1,506-21 ft. This producer is 1½ miles from other production in Aux Vases.

A prolific well was reported in White County at Coy Oil Co. 2 W. M. Finney in SW SW SE 14-5s-8e. The well flowed 1,104 bbl. per day from Aux Vases at 3,126-40 ft. Location is 3 miles east of Enfield.

Richard L. Moore 1 Robinson, NE SE SW 8-2s-4w, is being put on pump. The Silurian topped at 551 ft. filled up 275 ft. of oil. Location is ¼ mile from production and 6½ miles southwest of Mount Sterling.

Kentucky wildcat drilling

In southern Greenup County on Lost Creek, on the Oldtown Quadrangle, United Carbon Co. is drilling at 1,600 ft. on their wildcat 1 Felty.

(Continued on page 142)

Buckeye Grows With Patterson

. . . at the helm of the pipeline company. As president, he has pushed strongly for development of products lines.

TEN YEARS AGO, Buckeye Pipe Line Co. grossed $8.7 million and netted $1.3 million after taxes. Last year it grossed $21 million and netted $2.96 million.

When a company increases its business two and one-half times in a decade, it is either immensely lucky or exceptionally well managed. Old-time employes of Buckeye credit their company's meteoric growth to enterprising management.

They say that George Stuart Patterson, their young, energetic, imaginative president, is the big reason for the company's success.

Patterson, for his part, gives much of the credit to his organization. He once told the New York Society of Security Analysts, "What really makes the Buckeye Pipe Line tick is the calibre of its employes. I am certain that there is no organization, and I won't limit it to the pipeline industry, that has a more loyal and efficient group of men and women working for it."

Patterson carries the Alphonse-Gaston act a step further. He also gives much credit to Buckeye's board, an exceptional one for such a relatively small company. It is a nine-man board, with four outsiders.

The "outside" directors are nationally prominent business leaders: Robert F. Brown, senior partner, Kuhn, Loeb & Co.; Howard S. Bunn, president, Union Carbide Corp.; Benjamin J. Fiery, senior partner, Baker, Hostetler & Patterson, and general counsel, American League; and George S. Moore, president, First National City Bank of New York.

Who is right, Patterson or the veteran employes, may be a moot situation. However, one thing is certain: Buckeye's growth has come since Patterson was elected executive vice president in 1949. And that growth has come in the area which he has pushed most strongly, products pipelining.

Back in 1949, Buckeye delivered 275,920 bbl. of crude per day and 12,693 bbl. of products. In 1958, it delivered 396,036 bbl. of crude and 164,807 bbl. per day of products. While crude deliveries increased a shade over 5%, product deliveries increased almost 1,200%.

George S. Patterson
. . . from cotton buying to pipelining.

Background . . . Patterson, now 50 years old but 40 in appearance, joined Buckeye in 1940. His career to that point was about as far removed from pipelining as a career could be.

He was born in Philadelphia, graduated from St. Paul's School, Concord, N. H., in 1927 and from Yale, with a bachelor of arts degree, in 1931. His first job was with George H. McFadden & Brothers, cotton merchants in Memphis.

Patterson was a cotton-buyer in Texas for McFadden for 3 years, and then the company sent him to Europe.

When he returned to the U. S., he opened up a sales office for McFadden in Birmingham. It was Patterson's thirteenth move in 7 years, and he decided a job with less moving would be better for his wife and three children. That was his principal reason for switching from cotton to railroading, accepting a position in Philadelphia, in the industrial department of the Pennsylvania railroad.

But, after a year or so, he was moved to Baltimore as a freight traffic representative. Making another move may have been instrumental in his decision to go into pipelining.

Early in 1940, Patterson was approached by Buckeye to fill the position of assistant to its president. It took months for him to decide in favor of the challenge of a small company against the assured future of a big one. On October 1, 1940, he joined Buckeye.

He was elected a vice president May 1, 1942, and was concerned largely with personnel. A year later, he enlisted in the Marines. Just as he was being shipped out for overseas duty as a corporal, he was tapped for officers' candidate school. He served as a second lieutenant in Guam and the Pelilius and was discharged in 1945.

He returned to Buckeye December 1, 1945. In 1948, he was elected executive vice president, concentrating on development, and in 1952 was elected president.

Buckeye development . . . Since then, most of the plans of which Patterson was the chief architect have been carried out.

Most important and most beneficial of these was the eastern products division. It consists, principally, of a 16-in. line from Linden, N. J., to Macungie, Pa., a 14-in. line from there to Auburn, N. Y., with 10-in. lines eastward to Syracuse and westward to Caledonia.

Buckeye is continuing its concentration on products lines. This summer, it extended its midwest products system from Detroit to Flint and Owosso and its eastern products division was also connected to the Griffis Air Force Base at Rome, N. Y. Also this year, it began the operation of 41%-owned Everglades Pipe Line in Florida. This 35-mile 10-in. line delivers jet fuel and avgas from marine terminals at Port Everglades to Miami's International Airport.

Patterson makes no secret of the fact that Buckeye is interested in more products lines. The Everglades line was its first move out of the area the company has long operated in but almost certainly will not be the last.

The company has looked at potential product lines in a number of foreign countries. It is willing, according to its president, to "build, operate or consult on any kind of product line anywhere." There is only one qualification: It must be profitable for Buckeye.

Patterson's avowed preference for product lines is based on the belief that products are surer than crude. He points out that product lines generally join refineries and markets and that "you can count on refineries running and markets lasting for 20 years." Crude sources, on the other hand, can and do change rapidly.

Buckeye has a unique place in the

Personals

oil industry. It is the only fully independent crude and products system. Its stock is listed on the New York Stock Exchange and held by some 6,000 shareholders. It is exempt from the 7% consent decree which limits the earnings of shipper-owners. Theoretically, this makes it possible for Buckeye to make more than 7%, but, practically, it limits earnings for Buckeye since it must be competitive.

Buckeye will observe its seventy-fifth anniversary in 1961. According to Patterson, it expects to continue "to play an increasingly important role in the oil industry." He sees Buckeye's real function coming into play as "oil-company demands for capital continue to grow." Outside capital is building service stations and tankers for oil companies' use and, as he sees it, it will also be called upon to build pipelines, particularly for products.

"Buckeye will do what is advantageous for the oil companies," Patterson adds. Since 21 oil companies use Buckeye's system, they apparently agree.

●

Paul J. Parker, a director of Phillips Petroleum Co. and formerly secretary and treasurer, has been elected vice president, international. Parker will head a new international department which will handle Phillips' foreign activities under three divisions. Division managers will be **Harry D. Brookby,** exploration and production; **John Getgood,** sales and development; and **W. L. Phillips,** operations. Brookby was manager of the former international department. Getgood has been manager of the foreign sales and development department, and Phillips was vice chairman of the operating committee. **W. F. Martin,** formerly assistant secretary and assistant treasurer of Phillips, will succeed Parker as secretary and assistant treasurer. Getgood will headquarter in New York; the others will be in Bartlesville, Okla.

PARKER

Franklin R. Hall, southern division manager for Esso do Brasil in Sao Paulo, has been elected president and a director of Esso Standard Oil Co. (Uruguay) S. A. He succeeds the late William B. Brown.

D. Woodson Ramsey, Jr., coordinator of world-wide marketing for Standard Oil Co. (N. J.), will become vice president and a director of the new Humble Oil & Refining Co. He is the eighth member of the board to be selected. **Forrest M. Darrough,** vice president and general counsel of Carter Oil Co., will become associate general counsel of the new Humble. He will headquarter in Houston. The appointments will become effective after shareholders approve the reorganization of Jersey Standard's domestic subsidiaries.

WESTPHAL

Frederick C. Westphal, Jr., administrative superintendent of Esso Standard Oil Co.'s Bayway refinery, Linden, N. J., has been named manager of the Bayonne, N. J., refinery. He succeeds **David F. Edwards,** recently named employe relations manager of the new Humble Oil & Refining Co. Westphal joined Esso in 1940. He became administrative superintendent at Bayway last year.

Newton B. Dismukes, assistant production manager for Mobil Oil Co. de Venezuela, has been named production manager for Mobil International Oil Co.'s producing department. He will headquarter in New York. Dismukes succeeds **G. R. Lucie-Smith,** who has been appointed general manager in Libya for Mobil Oil of Canada, Ltd.

A. N. (Al) Horne, vice president, general manager, and a director of Texaco-Cities Service Pipe Line Co. and vice president and general manager of Kaw Pipe Line Co., will retire December 1 after 41 years as pipeline builder and manager. He will continue to do consulting work. Horne was general manager of Empire Pipe Line Co. before World War II. During the war he became vice president and assistant manager, later general manager of War Emergency Pipe Lines, Inc. Later he was vice president and assistant director of Texas-Empire Pipe Line Co., now Texaco-Cities Service. In 1949, on loan from Texaco, he became resident vice president and general manager of Trans-Arabian Pipe Line Co. From Tapline operations he moved to Trans-Northern Pipe Line Co., Toronto, as president and general manager for design, construction, and operational setup. He had held his present post since 1954.

HOOPMAN

Harold D. Hoopman, operations manager for Ohio Oil Co. of Guatemala, has been appointed resident manager. He succeeds the late J. Patrick D'Artois. **Clark M. Shimeall,** chief geologist of the company, has moved up to exploration manager. He succeeds **Arthur H. Petsch,** who has retired. Hoopman has been with Ohio since 1946 and had been operations manager of Ohio of Guatemala since 1957.

Don F. Carlos, southern division exploitation geologist for Tidewater Oil Co., has been appointed executive assistant to **Thomas G. Kelliher,** manager of Tidewater's home office exploration department in Los Angeles.

V. L. Brant, DX Sunray Oil Co., has been elected chairman of the Tulsa section of American Institute of Chemical Engineers. He succeeds **G. L. Farrar,** engineering editor of The Oil and Gas Journal. Other new officers are **A. C. Frederick,** Refinery Engineering Co., vice chairman, and **Robert L. Rorschach,** Warren Petroleum Corp., secretary-treasurer.

Alex S. Chamberlain has been elected president of Louisville Refining Co., Louisville, Ky., and its subsidiary, Producers Pipe Line Co., Owensboro, Ky. The two companies were recently purchased by Ashland Oil & Refining Co. Chamberlain will continue as a vice president of Ashland and will act as coordinator of Ashland's operations in the Louisville area.

Grant H. Young, Ohio Oil Co.'s assistant manager of marketing, has been elected vice president in charge of marketing. He succeeds **Nelson T. Stover,** who has retired. Young joined Ohio in 1930. He has been district marketing manager in Oklahoma City and Indianapolis, assistant retail sales manager, assistant to the president, and manager of the market development division. Stover retires after 46 years with Ohio. He had been marketing vice president since 1953.

YOUNG

▶▶▶ Personals

HEMSELL

WEEKS

D. C. Hemsell, manager of Phillips Petroleum Co.'s land and geological department, has been named assistant to **C. O. Stark,** vice president for land and geology. **W. B. Weeks,** assistant manager of the land and geological department, will succeed Hemsell. **E. Van den Bark,** southwest regional manager, will succeed Weeks. **A. J. Hintze** continues as director of exploration. In other appointments, **R. J. Haas,** southwest regional geologist, has been named southwest regional manager. **T. H. Montgomery,** Lafayette, La., division manager, has been transferred to Bartlesville, Okla., to succeed **R. E. McPhail** as southwest regional manager. McPhail has been named staff geologist. **S. J. Talley** and **C. F. Lawrence,** division development geologists in Amarillo and Midland, Tex., have been transferred to Bartlesville as exploration geologist and development geologist for the southwest region. In the Lafayette division, **S. A. Spencer,** assistant division manager and exploration geologist, becomes division manager. **C. W. McBride,** division landman, will be assistant division manager. **E. S. Hastings,** district exploration geologist, has been named division exploration geologist. In other moves, **K. S. Blanchard,** division development geologist, has been transferred to Midland from Wichita Falls, Tex. **K. M. Jastrow,** assistant division landman in Midland, has been named division landman. **L. G. Williams,** Evansville, Ind., division assistant manager and exploration geologist, has been named Billings, Mont., division manager. **M. A. Vaughan,** assistant division exploration geologist in Oklahoma City will succeed Williams. **B. S. Geho,** assistant division development geologist in Amarillo, has been named division development geologist.

Robert E. Yancey, formerly vice president for manufacturing with Ashland Oil & Refining Co., and **Orin E. Atkins,** formerly coordinating executive assistant, have been elected administrative vice presidents of the company.

Alexander Clark, vice president and a director of Home Oil Corp. Ltd., has been elected president of Calgary & Edmonton Corp., Ltd. He will join the company January 1. Clark was vice president and a director of Federated Petroleums, Ltd., before joining Home Oil in 1953. He was with Shell Oil Co. before joining Federated.

MITCHELL

FRANK

Johnny Mitchell, partner in Christie, Mitchell, & Mitchell, has been elected president of Jade Oil Co., California producing firm. Mitchell succeeds **Harry M. Frank,** who becomes chairman and chief executive officer. Jade will open an office in Houston and plans to broaden operations, particularly in Texas. Other officers elected at a recent board meeting are **H. L. Leach,** vice president and treasurer; **J. Roy Derrick,** vice president, **Paul A. Smith,** secretary; and **B. F. Clark,** assistant treasurer.

F. P. Burns, vice president of Texoma Production Co., **C. E. Holmes,** vice president, and **Remick McDowell,** president of Peoples Gas Light & Coke Co., the parent firm, have been elected directors of Texoma. Burns has also been named a director of Peoples Production Co., an affiliate.

▶▶▶ Deaths

Floyd Ralph Hyer, 69, Okmulgee, Okla., independent, died October 20 in a Tulsa hospital.

Albert Glass, 78, retired Southern California Gas Co. division manager, died November 16 in Huntington Park, Calif.

Colonel Isaac June, 87, pioneer pipeliner, died November 16 in Abilene, Tex. June joined Buckeye Pipe Line Co. in 1890. He later was with Eureka Pipeline Co. in West Virginia and Prairie Pipe Line Co., a predecessor of Sinclair Pipe Line, in Oklahoma. He retired in 1942.

C. R. Conklin, 63, Youngstown, Ohio, general sales manager of Republic Rubber division of Lee Rubber & Tire Corp., died recently in Chicago while attending an industry association meeting.

J. E. Swanson, 68, former president and vice chairman of the board of Graver Tank & Manufacturing Co., East Chicago, died November 14. Swanson had been a consultant to Graver since the company became a division of Union Tank Car Co. earlier this year. Swanson joined Graver in 1912.

Henry H. McConnell, 84, retired secretary and treasurer of Pennsylvania Gas Co., died November 17 at his home in Warren, Pa. McConnell had been with Ohio Oil Co., South Penn Oil Co., and Standard Oil Co. (N. J.) at one time. He retired in 1934. He was the father of **Elliott B. McConnell,** vice president of Standard Oil Co. (Ohio).

Harry Merriman Lowe, 52, western division manager for Sperry-Sun Oil Well Surveying Co., died November 17 in Long Beach, Calif.

George B. Holden, 42, director of the Arkansas Oil and Gas Commission, died November 19 in El Dorado, Ark. Holden had been director of the commission since 1955.

William Burton Duckworth, 63, tax and insurance manager for Gulf Oil Corp. in Tulsa, died November 20 in his Tulsa home after a heart attack. Duckworth joined Gulf in 1919. He had been head of the Tulsa tax department since 1954.

H. L. Kirkpatrick, 51, head of Kirkpatrick & Associates, Shreveport, La., petroleum engineering and geological consulting firm, died November 22 in a Shreveport hospital of a heart attack. Kirkpatrick was a director of Petroleum Investments, Inc., of Shreveport. He was assistant chief production engineer for Arkansas Fuel Oil Co. before becoming a consultant in 1947.

Theodore Raymond Bibee, 60, retired employe relations manager for Gulf Oil Corp.'s Houston production division, died November 24 in Houston after a heart attack. Bibee was zone production superintendent in Laurel, Miss., before his Houston assignment. He retired in 1954.

High stocks in two districts depress prices

BY JOHN C. CASPER

A quick look at the highlights

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,957,260	UP	55,620	DOWN	22,290
Crude stocks	253,948,000	DOWN	91,000	DOWN	2,644,000
Completions	981	DOWN	137	UP	13
Refinery runs	8,017,000	UP	125,000	UP	137,000
Gasoline stocks	177,260,000	UP	860,000	UP	7,684,000
Kerosine stocks	31,970,000	DOWN	729,000	DOWN	185,000
Distillate stocks	174,571,000	DOWN	4,342,000	UP	12,156,000
Residual stocks	56,292,000	DOWN	1,698,000	DOWN	10,327,000
Four-product stocks	440,093,000	DOWN	5,909,000	UP	9,328,000
Total imports	1,582,600	DOWN	243,400	DOWN	150,400

IT'S STOCK-SHIFT TIME. The big gasoline season is over, and refiners are starting to run part of each week's production of motor fuel to storage. The gasoline-stock decline has not been smooth this fall because of the big demand week at the end of September. Consumers and resellers stocked up on gasoline before the extra cent was added to the federal tax on October 1.

Gasoline demand dropped below 4,000,000 bbl. daily for week ended November 13 and can be expected to decrease gradually until sometime in February.

Distillate demand is gaining. The total topped 2,000,000 bbl. daily for the week ended November 13. For the next 3 months, distillate demand will gain more than gasoline will lose. And, despite the normal winter increase in refinery runs, clean-product stocks will decrease. Kerosine and distillate stocks dropped almost 88,000,000 bbl. last winter compared with a gain of 43,000,000 bbl. in gasoline inventories.

With clean-product stocks declining, refiners have the remaining winter months to adjust the balance between supply and demand. And yet, gasoline and distillate prices are under pressure in two of the important market areas.

East Coast distillate markets have been so soft that suppliers were not able to raise prices at the end of the summer-fill discount period. Group 3 gasoline is selling for the lowest price since early in 1955 despite the fact that gasoline quality has improved four octane numbers.

Prices in these two districts have been influenced by concentration of stocks in the areas. Distillate stocks are too high on the Gulf Coast and have been even more out of line on the East Coast. Gasoline stocks are heavy in District 2.

The table at left, below, shows gasoline and distillate inventories for November 13 of this year compared with data for the past 2 years.

Gasoline-stock total on the East Coast is at about last year's level and 4,000,000 bbl. under the total reported in 1957. On the Gulf Coast, gasoline stocks are lower than they were last year or the year before.

Every area in District 2 has more gasoline on hand than at this time last year. But, the big gain is in the Oklahoma-Kansas-Missouri refining district where gasoline stocks are 12.4% higher than last year and 25.5% above the total for November 15, 1957.

Distillate inventories on the East Coast show a gain of 19.4% over last year. Texas Gulf stocks are up 28.4%, and Louisiana Gulf 3.5%.

The table at right below shows district stock changes for a 3-month period each year since 1955. The period is from the end of July to the end of October. Note that the gasoline-stock total for District 2 dropped only about a million barrels this year compared with almost 6 million last year.

Heavy distillate inventories in Gulf-East Coast districts can't be charged entirely to late-summer and early-fall gains. Part of the buildup developed in the spring and part was left over at the end of winter. The accumulated surplus has been large enough to hold prices well below normal so far this winter.

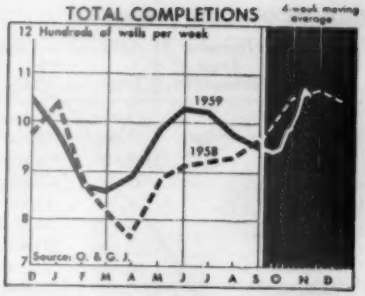
PRODUCT STOCKS

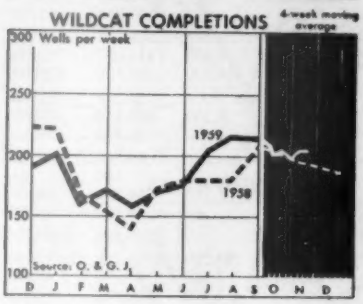
	Gasoline			Distillate		
	11-15-57	11-14-58	11-13-59	11-15-57	11-14-58	11-13-59
East Coast	44,678	40,235	40,235	67,155	59,575	71,145
Appalachian:						
District 1	4,923	4,661	5,471	3,566	3,838	4,701
District 2	2,537	2,448	2,843	1,467	1,415	1,925
Ind., Ill., Ky.	31,104	29,028	29,946	23,880	30,831	29,882
Minn., Wis., Dak.	6,351	6,583	7,277	8,325	8,935	7,940
Okla., Kans., Mo.	13,845	15,465	17,387	13,512	13,122	11,710
Inland Texas	6,872	6,548	7,022	2,619	2,233	1,916
Tex. Gulf Coast	24,109	23,390	21,744	19,264	17,321	22,236
La. Gulf Coast	11,166	9,780	9,444	9,365	7,622	7,891
N. La. and Ark.	4,482	4,052	4,773	2,137	2,229	2,272
Rocky Mountain:						
New Mexico	418	501	809	134	139	225
Other	5,454	4,412	4,486	3,001	2,962	2,667
West Coast	26,239	22,206	24,963	17,086	14,108	14,403
Total U. S.	182,178	169,309	176,400	171,511	164,330	178,913

PRODUCT STOCK CHANGES

(Thousands of barrels)

	Dist. 2 Gasoline			Gulf-E. Coast Distillate		
	July 31	Oct. 31	Change	July 31	Oct. 31	Change
1955	51,130	48,160	−2,970	60,326	81,368	21,042
1956	56,577	53,157	−3,420	60,085	84,779	24,694
1957	53,949	53,502	− 477	72,520	98,343	25,823
1958	60,052	54,390	−5,662	57,151	85,300	28,149
1959	58,477	57,400	−1,077	76,635	101,100	24,465





Active Rotary Rigs

	11-23-59	11-16-59	11-24-58
Alabama	6	5	13
Arkansas	14	15	26
Arizona	0	1	1
California	104	102	88
Land	97	96	(*)
Offshore	7	6	(*)
Colorado	59	53	25
Florida	1	2	1
Land	1	1	1
Offshore	0	1	0
Illinois	42	49	58
Indiana	10	9	7
Iowa	0	0	3
Kansas	159	146	136
Kentucky	11	4	8
Louisiana	321	308	327
North	46	45	40
S. Inland waters	114	111	140
S. Land	106	98	105
Offshore	55	54	42
Maryland	0	0	1
Michigan	36	38	13
Mississippi	75	72	57
Missouri	1	0	2
Montana	22	21	22
Nebraska	24	22	21
Nevada	1	1	0
New Mexico	126	125	107
New York	0	0	1
North Dakota	26	22	27
Ohio	0	0	5
Oklahoma	248	241	253
Oregon	0	0	0
Pennsylvania	11	8	10
South Dakota	6	5	0
Texas	778	785	804
S. Inland waters	6	†2	8
S. Land	185	†189	150
Offshore	3	2	1
North-East	200	197	174
West Central	238	239	293
West	146	156	178
Utah	30	29	41
Washington	1	1	1
West Virginia	5	5	3
Wyoming	89	90	77
Total U. S.	**2,206**	2,159	2,138
Western Canada	171	148	165
Eastern Canada	1	1	3
Grand total	2,378	2,308	2,306

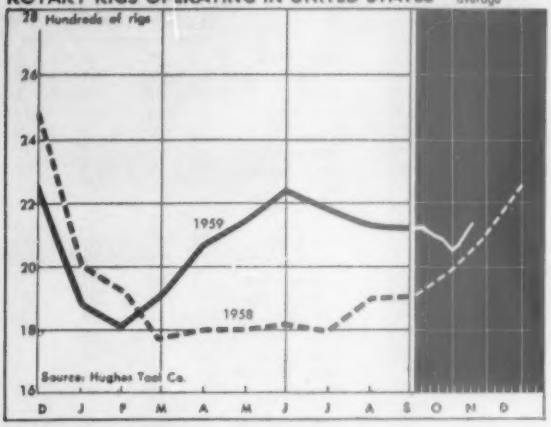
Hughes Tool Co. report. *Comparisons not available due to change in method of reporting. †Revised.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED NOVEMBER 21, 1959

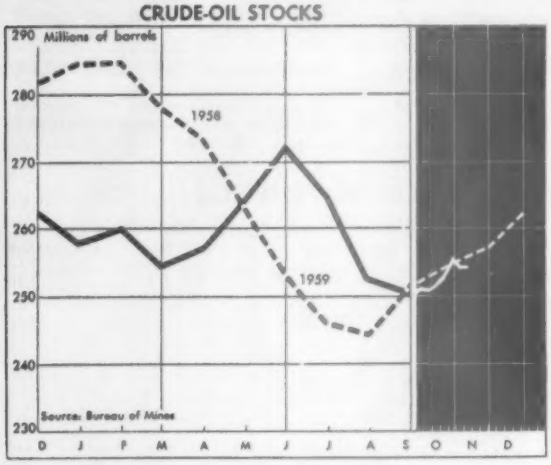
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1959	1958	Total	Crude	Cond.	Gas	Dry	1959	1958
Alabama	1	0	0	0	1	0	1,275	83	69	1	0	0	0	1	21	26
Arizona	0	0	0	0	0	0	0	25	.....	0	0	0	0	0	23	.....
Arkansas	11	3	0	0	8	0	35,202	746	720	4	0	0	0	4	131	146
California	41	20	0	3	18	0	180,835	1,375	1,353	9	2	0	0	7	361	332
Colorado	14	4	0	2	8	0	70,771	685	766	9	2	0	0	7	387	440
Illinois	31	8	0	0	22	1	66,739	2,091	2,106	12	0	0	0	12	355	406
Indiana	18	4	0	0	14	0	22,119	771	768	7	1	0	0	6	263	278
Kansas	86	25	0	7	51	3	337,537	3,549	3,593	28	3	0	2	23	943	747
Kentucky	198	147	0	0	50	1	130,268	2,667	1,667	31	2	0	0	29	323	159
Louisiana	87	47	9	5	26	0	660,474	3,366	3,100	12	3	0	1	8	459	457
North	40	25	0	5	10	0	142,216	1,333	1,216	4	2	0	1	1	206	202
South	40	20	7	0	13	0	440,782	1,673	1,505	8	1	0	0	7	238	231
Offshore	7	2	2	0	3	0	77,476	360	379	0	0	0	0	0	15	24
Michigan	26	9	0	4	13	0	76,541	588	389	8	0	0	0	8	162	131
Mississippi	9	4	1	0	4	0	98,526	574	354	6	2	0	0	4	252	158
Montana	6	3	0	0	3	0	35,454	311	290	3	0	0	0	3	108	117
Nebraska	14	5	0	0	9	0	79,087	802	658	5	0	0	0	5	348	313
New Mexico	38	23	1	8	6	0	151,464	1,869	1,758	5	1	0	0	4	218	239
West	11	2	1	7	1	0	50,943	835	870	1	1	0	0	0	59	94
East	27	21	0	1	5	0	100,521	1,034	888	4	0	0	0	4	159	145
New York	0	0	0	0	0	0	0	237	483	0	0	0	0	0	19	41
North Dakota	3	2	0	0	1	0	22,043	392	410	1	0	0	0	1	70	129
Ohio	27	15	0	4	5	3	79,184	971	917	2	1	0	1	0	29	17
Oklahoma		(Figures not available)					.....	4,810	5,643	..	..	..	..	..	735	770
Pennsylvania	0	0	0	0	0	0	0	523	528	0	0	0	0	0	19	19
South Dakota	3	2	0	0	1	0	25,636	19	.....	0	0	0	0	0	8	.....
Texas	325	185	11	17	105	7	1,401,174	16,667	16,079	69	3	0	6	60	3,134	3,230
Dist. 1	21	8	1	1	11	0	58,650	966	884	8	0	0	0	8	296	339
Dist. 2	23	12	3	3	4	1	141,411	720	663	4	0	0	1	3	211	174
Dist. 3	20	10	0	0	10	0	122,529	1,056	1,145	4	0	0	0	4	209	262
Dist. 4	22	7	2	6	7	0	118,665	1,199	1,031	10	1	0	3	6	300	305
East	26	11	0	0	15	0	138,107	1,130	1,094	9	0	0	0	9	218	296
Dist. 7-B	55	25	0	4	23	3	147,370	2,322	2,220	12	1	0	2	9	616	596
West	91	67	1	2	20	1	430,925	5,004	4,596	12	0	0	0	12	680	631
Dist. 9	48	32	0	1	13	2	130,100	3,118	3,258	8	1	0	0	7	508	513
Dist. 10	19	13	4	0	2	0	113,417	1,152	1,188	2	0	0	0	2	96	114
Utah	6	2	0	2	2	0	35,754	274	354	3	0	0	2	1	78	76
West Virginia	24	2	0	17	3	2	64,673	694	684	0	0	0	0	0	27	16
Wyoming	13	2	0	1	10	0	81,181	861	673	8	0	0	0	8	312	228
Miscellaneous	0	0	0	0	0	0	0	83	86	0	0	0	0	0	56	76
Total U. S.	**981**	512	22	70	360	17	3,655,937	45,033	43,448	**223**	20	0	12	191	8,841	8,551
Previous week	1,118	573	28	84	405	28	4,343,332	.....	.....	207	15	2	7	183	.....	.....
Cum. 1959	45,033	22,467	1,096	3,339	16,870	1,261	185,565,015	.....	.....	8,841	790	98	293	7,660	.....	.....
Cum. 1958	43,448	21,397	995	3,288	16,584	1,184	176,261,815	.....	.....	8,551	823	140	235	7,353	.....	.....
Western Canada	63	29	0	12	18	4	311,785	2,142	2,211	15	1	0	1	13	588	586

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	11-14-59	11-7-59	11-15-58
Pennsylvania	2,526	2,536	2,824
Other Appalachian	1,960	1,968	1,674
Illinois, Indiana, Michigan	10,199	10,333	9,812
Nebraska and North Dakota	3,249	3,025	2,546
Kansas	9,425	9,394	10,393
Oklahoma	15,187	15,448	17,222
Arkansas	2,215	2,315	2,237
Louisiana	18,455	18,298	17,514
North	3,220	3,135	2,831
South	15,235	15,163	14,683
Mississippi, Alabama, Florida	2,171	2,182	2,366
New Mexico	8,272	8,663	8,578
Texas	110,537	110,557	109,583
East Texas	8,266	8,033	8,111
West Texas	53,514	52,601	53,054
Texas Gulf	19,036	19,209	19,824
Other Texas	29,721	30,714	28,594
Wyoming	16,969	16,877	13,524
Other Rocky Mountain	8,990	9,457	9,122
California	28,631	28,746	33,230
Foreign	†15,162	14,240	15,967
Total	253,948	254,039	256,592

*Bureau of Mines. †Includes 5,141,000 bbl. in California.

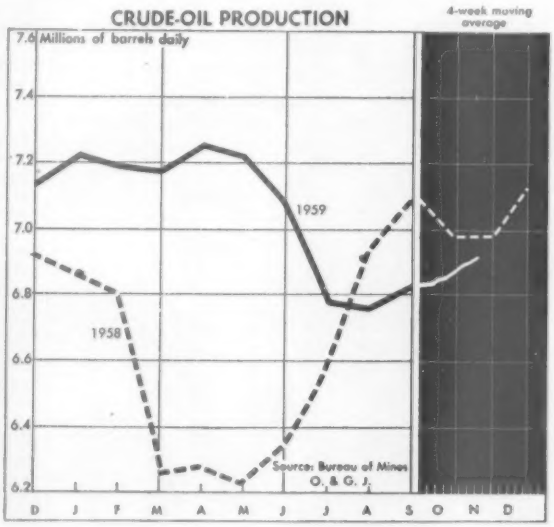
DAILY AVERAGE PRODUCTION FOR WEEK

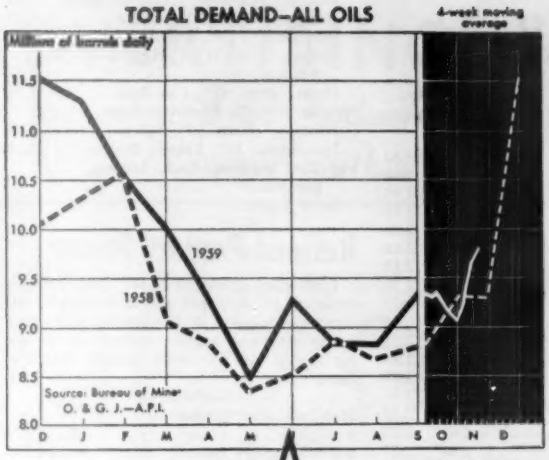
	November 21, 1959			Nov. 14
	Crude oil	Lease condensate	Total	total
Alabama	13,500	.....	13,500	16,250
Arkansas	57,520	280	57,800	52,620
California	838,400	.....	838,400	836,100
Colorado	128,200	.....	128,000	127,900
Eastern	41,800	.....	41,800	42,500
Florida	1,170	.....	1,170	1,170
Illinois	219,600	.....	219,600	220,600
Indiana	31,400	.....	31,400	32,200
Kansas	†332,330	.....	†332,330	†323,490
Kentucky	77,800	.....	77,800	75,500
Louisiana	923,230	116,300	1,039,530	1,038,000
North	108,230	5,800	114,030	112,500
South	815,000	110,500	925,500	925,500
Michigan	32,200	.....	32,200	32,100
Mississippi	140,050	4,100	144,150	144,150
Montana	80,800	.....	80,800	79,600
Nebraska	64,800	.....	64,800	65,300
Nevada	100	...	100	100
New Mexico	288,600	5,550	294,150	294,150
North Dakota	48,100	.....	48,100	44,500
Oklahoma	†550,100	.....	†550,100	†523,700
Texas	2,443,000	80,200	2,523,200	2,523,200
Dist. 1	43,000	2,800	45,800	45,800
Dist. 2	104,000	8,400	112,400	112,400
Dist. 3	318,000	38,000	356,000	356,000
Dist. 4	171,000	9,600	180,600	180,600
Dist. 5	25,000	400	25,400	25,400
Dist. 6	102,000	9,500	111,500	111,500
East Texas field	133,000	.....	133,000	133,000
Dist. 7-B	126,000	180	126,180	126,180
Dist. 7-C	118,000	3,320	121,320	121,320
Dist. 8	996,000	5,000	1,001,000	1,001,000
Dist. 9	201,000	2,000	203,000	203,000
Dist. 10	106,000	1,000	107,000	107,000
Utah	92,470	.....	92,470	80,850
Wyoming	345,200	.....	345,200	347,300
Others	‡460	.....	‡460	‡360
Total U. S.	6,750,830	206,430	**6,957,260**	6,901,640
Change from prev. week, up			**55,620**	
Canada	†516,400	.....	†516,400	†508,000

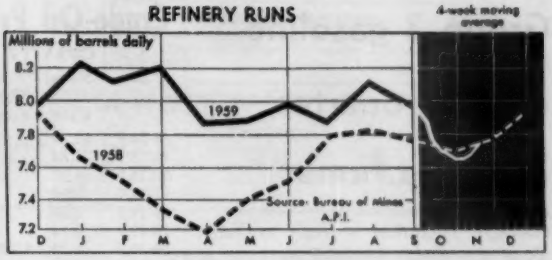
Total U. S. prod., January 1-November 21 .... §2,285,761,720 bbl.
Same period last year (crude plus cond.) ..... *2,164,551,780 bbl.

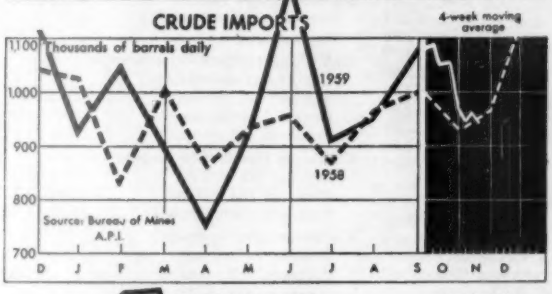
*Includes 51,582,230 bbl. condensate. †Week ended previous Monday. ‡Arizona, South Dakota and Washington. §Revised.

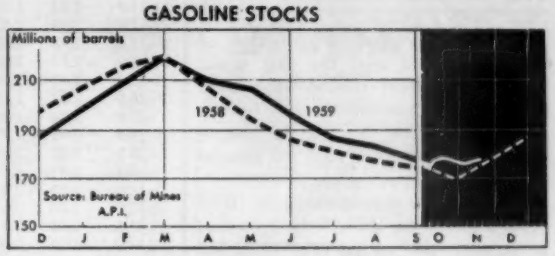
CRUDE-OIL PRODUCTION

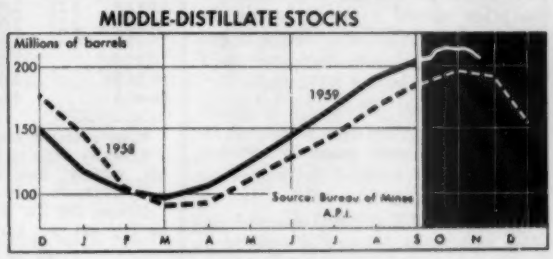


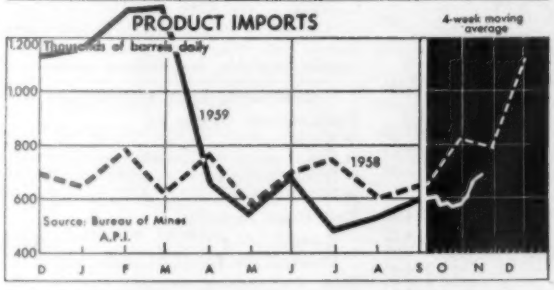


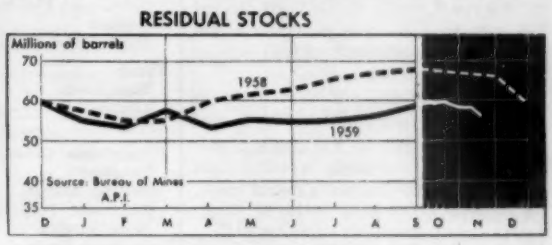












API REFINERY REPORT—NOVEMBER 20, 1959

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, November 1958—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,142	512.2	30.7	333.7	168.0	39,432	14,084	69,501	11,382	1,107	491.7	34.4	347.1	168.7
Appalachian:														
District 1	84	35.4	5.0	18.3	10.3	5,717	743	4,632	420	95	41.1	3.9	19.7	10.0
District 2	84	53.1	5.6	18.1	19.6	2,738	574	1,755	537	102	50.7	4.7	18.8	12.4
Ind., Ill., Ky.	1,515	793.2	83.3	340.3	177.4	29,272	6,861	28,583	6,335	1,401	745.2	70.1	299.9	174.0
Minn., Wis., Dak.	114	53.6	5.1	24.3	19.1	7,193	1,448	7,605	560	106	50.3	6.3	28.4	11.8
Okla., Kans., Mo.	714	376.7	14.0	180.3	33.1	17,661	1,573	11,381	1,025	702	383.5	14.4	173.8	21.2
Inland Texas	287	219.7	6.1	51.3	22.7	7,034	523	1,817	2,318	288	213.8	9.1	49.0	19.9
Tex. Gulf Coast	1,793	905.7	115.4	427.6	146.9	21,451	2,975	22,506	5,979	1,804	958.7	126.1	446.7	191.0
La. Gulf Coast	730	395.4	40.9	172.7	45.3	10,397	1,522	7,786	1,344	680	384.9	72.1	164.4	47.4
N. La. and Ark.	64	61.6	1.9	21.6	6.9	4,948	935	2,058	257	82	43.1	3.2	20.7	6.1
Rocky Mountain:														
New Mexico	26	15.4	0	4.8	2.7	890	26	236	44	25	12.9	0.4	4.6	2.5
Other	295	139.6	6.4	61.3	33.7	4,597	307	2,528	1,253	271	131.8	2.2	63.2	33.4
West Coast	1,169	555.0	1.7	140.1	276.4	25,930	399	14,183	24,838	1,113	520.0	3.1	175.8	280.3
Nov. 20, 1959	8,017	4,116.6	316.1	1,794.4	962.1	177,260	31,970	174,571	56,292	7,776	4,027.7	350.0	1,812.1	978.7
Nov. 13, 1959	7,892	3,977.0	316.4	1,757.4	856.0	176,400	32,699	178,913	57,990	.....	.....	.....	.....	.....
Nov. 21, 1958	7,880	3,980.1	353.4	1,813.6	909.4	169,576	32,155	162,415	66,619	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Group 3 gasoline drops a quarter; fuels are firmer

GROUP 3 gasoline is freely available along the Great Lakes Pipe Line at 10.25 cents a gallon for regular grade. This price represents a reduction of about 0.25 cent over the past week. There are market rumors that large private-brand distributors can buy at 10 cents a gallon, but the 10.25-cent quotation seems to be near the general market price.

Some regular gasoline sold for 10.25 cents a gallon on the Group 3 market in the early part of the year 1955, but the price moved back up before the end of April that year. Also, that gasoline was 86 octane compared with the current rating of 91 octane.

Some market observers have expressed the opinion that Group 3 refiners cannot sell gasoline for less than 10 cents without cutting prices they pay for crude.

Standard Oil Co. (Ind.) lowered gasoline tank wagon prices in most of its territory last week. Reductions ranged 0.8 cent to 1.3 cents per gallon. Indiana also raised distillate tank-wagon prices 0.5 cent.

Distillate prices are very firm in District 2. Quotations for No. 2 fuel are up 0.25 cent to 9.0 cents a gallon. No. 1 fuel is in a very tight position in the North Central area. Its current price of 9.75 cents a gallon is only half a cent under the price quoted for regular gasoline.

Residual prices are firming in the Mid-Continent area. Quotations for regular residual range up to $1.60 a barrel. Low-sulfur material carries a price tag of $1.70-1.80.

Gasoline prices are firm on the Gulf Coast but housebrand-quality material can be bought at 0.25 cent off formal postings or 10.75 cents for 92-octane fuel. A major marketer bought two cargoes of gasoline on the Gulf Coast, but information on actual prices paid was not reported.

Distillate is very soft on the Gulf. Negotiated prices for No. 2 fuel in the New York Harbor area are so low that the netback to the Gulf Coast would represent a discount of 0.75 cent off formal cargo postings or 7.375 cents.

High stocks and low demand are holding East Coast distillate prices at or below summer discount levels.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill§ Calif.	Okla-homa	Gulf Coast Tex.*	West Tex.† N.M. (sour)	Wyo.
14-14.9	$1.76	....	....	....	....
15-15.9	1.84	....	....	....	$1.81
16-16.9	1.92	....	....	....	1.86
17-17.9	2.00	....	....	....	1.91
18-18.9	2.08	....	....	....	1.96
19-19.9	2.16	....	....	....	2.01
20-20.9	2.24	$2.49	....	$2.35	2.06
21-21.9	2.32	2.52	....	2.38	2.11
22-22.9	2.39	2.55	....	2.41	2.16
23-23.9	2.46	2.58	$3.44	2.44	2.21
24-24.9	2.53	2.61	3.46	2.47	2.26
25-25.9	2.60	2.64	3.48	2.50	2.31
26-26.9	2.67	2.67	3.50	2.53	2.36
27-27.9	2.74	2.70	3.52	2.56	2.49
28-28.9	2.81	2.73	3.54	2.59	2.54
29-29.9	2.87	2.76	3.56	2.62	2.59
30-30.9	2.93	2.79	....	2.65	2.63
31-31.9	3.00	2.82	....	2.68	2.67
32-32.9	3.06	2.85	....	2.71	2.71
33-33.9	3.12	2.88	....	2.74	2.75
34-34.9	3.17	2.91	....	2.77	2.79
35-35.9	3.22	2.94	....	2.80	2.83
36-36.9	3.27	2.97	....	2.83	2.87
37-37.9	3.31	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Low cold test crude. †Sour.

Effective dates of broad changes: California, 9-11-59; East of California, January 3-10, 1957; Pennsylvania Grade 9-12-59.

§Union Oil Co. of California posting up to 25c less per barrel.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.40
Middle District	4.22
Southwest Pennsylvania	3.95
West Virginia	3.77
Buckeye Grade	3.62
Illinois Basin	**3.00**

FOREIGN

Canada:	
Leduc-Woodbend	2.53
Redwater (Alta.)	2.42
Smiley (Sask.)	2.18
Pembina	2.38
Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.34
San Joaquin, 41°-41.9°, Puerto La Cruz	3.08-3.10
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):	
Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.86
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05
Middle East, E. Mediterranean:	
Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.57

Refined-Product Prices

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
★ Regular (91 octane)	10.25-10.50
★ Premium (99 octane)	13.00-13.25
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.50-10.75
Regular (92 octane)	10.75-11.00
Premium (98 octane)	12.00-12.25
California (rack) (Los Angeles):	
Regular (88 octane)	11.65-12.25
Premium (94 octane)	12.65-13.25
Premium (100 octane)	14.15-14.50
Caribbean area (cargoes):	
Regular (87 octane)	10.375
Premium (97 octane)	12.00

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
★ Kerosine 42-44	10.00
★ Diesel oil (58 d.i. and above)	9.75
★ Distillate No. 1	9.75
★ Distillate No. 2	9.00
Gulf Coast (cargoes):	
Kerosine 41-43	8.625
Distillate No. 2	8.125
New York Harbor (barges):	
Kerosine 41-43	9.40-9.60
Distillate No. 2	8.90-9.10
Diesel fuel, 48-52 d.i.	9.20-9.40
Caribbean area (cargoes):	
Distillate No. 2	8.125

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★ Residual fuel (max 1% S)	$1.70-1.80
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.37
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.15

Tanker Rates (Long Ton)

(Latest reported spot fixtures)

Gulf-USNH, dirty (ATRS —27.5%)	$2.07
Carib.-USNH, dirty (ATRS —45%)	1.51
Carib.-UK, dirty (Scale—45%) (17s. 9d.)	2.50
PG-Japan, dirty (USMC—65%)	3.57

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A REAL BUY—Two 36-L Bucyrus-Erie Drilling Machines, skid mounted, GK Waukesha engines, located, Luling, Texas. Priced exceptionally low. Degen Pipe & Supply Co., Tulsa, Oklahoma.

A REAL BARGAIN—3 complete RL Cardwells, with 150/HP engines, 2 with telescopic masts; one only 7 years old. Located Tulsa, Pampa, Texas, Chase, Kansas. Unusually low price. Degen Pipe & Supply Co., Tulsa, Oklahoma.

FOR SALE: Failing 1500 heavy duty drilling rig truck mounted, 5 x 8 Gardner Denver pump and motor, welder, light plant on trailers, 1200 water tank on R185, 2-ton flatbed winch and headframe, Pickup, House Trailer, 1,680 feet 2⅜ drill pipe, diamond core barrels, 8 drill collars, subs, adaptors, handtools. Graystone Drilling Co., 404 Texaco Bldg., Dallas, Texas. RI 7-5707.

—PIPE—
300,000 ft. 10¾" O.D. 35#
200,000 ft. 8⅝" O.D. 28½#
100,000 ft. 13⅜" O.D. 40#
30,000 ft. 16" O.D. 42#.
all No. 1 grade, plain end cleaned
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YDMG
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GAMMA RAY PROBE
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POWER PLANT
EXCELLENT OPERATING CONDITION

$4,500

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3 COMPLETE UNIT rigs for sale U-15 drawworks. 2 Rigs are powered by 3 NKU Waukesha engines. 1 rig powered by 2 LRO Waukesha engines. Drill pipe and collars optional. Rigs may be seen at Henson Drilling Company yard in Abilene, Texas. Complete inventory on request.

FOR SALE—900 feet of 10 lb. 7" I.D. well casing used but in good condition; also 380 feet of the same size new and never used. The Ridge Creek Gas & Oil Co. Inc., 20 North Hanover St., Carlisle, Pa.

FOR SALE—4 75 HP, AC, 1200 RPM, 220/440 V, explosion proof electric motors. All in excellent condition; 1 used 1 month. Powder-river Pipeline, Inc., 302 Fratt Building, Billings, Montana.

20,000' 6⅝" O.D. x .250" wall, plain end used line pipe. 30,000' 10¾" O.D. x .307" wall, plain end used line pipe. Other sizes in stock. The Buckeye Supply Company, 18 Harrison Street, Zanesville, Ohio, Phone GLadstone 2-3641.

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2200' 7⅝ 33.70 N80 Speedtite, once run Jennings, Louisiana.
4490' Good used 2⅜ 6.20# 4145 Steel PH6 Hydril Jts.
811' 2⅜ 7.90# 4140 Steel PH6 Hydril Jts.
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26,700 CFM 15 PSIG
2—1,700 HP Turbine Drive
22,500 CFM 15 PSIG

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10'x145'-125 PSI 30 trays
9'6"x121'6"-325 PSI 30 trays
8'6"x103'6"-165 PSI 24 trays
7'x82'-75 PSI 30 trays
6'x80'-300 PSI 30 trays
4'x44'6"-150 PSI 12 trays
3'6"x36'4"-400 PSI 12 trays
30"x52'4"-360 PSI 22 trays
26"x57'-78 PSI 4 trays

HEAT EXCHANGERS-CONDENSERS-REBOILERS
Steel tube 7,500 to 100 sq. ft.
Admir tube 3,500 to 236 sq. ft.
Cu Ni tube 2,330 to 308 sq. ft.

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1—Two Stage CENTRIFUGAL
7,860 CFM 2,000 HP
3—RA5 Gas Engine with
2VTH 17"x14" Cylinders

PUMPS
HOT OIL—5,150 GPM to 100 GPM
CENTRIFUGAL—12,650 GPM to 25 GPM
STEAM—Simplex and Duplex

PRESSURE DRUMS
12'x50' to 4'x10'-325 to 50 PSI
Horizontal and Vertical

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ELEVATORS—Passenger & Freight
FLARE TOWER—300' High
FURNACE TUBES—4" Croloy 5; 6" Ni-Cr.
INSTRUMENTS—All Types & Ranges
MOTORS & STARTERS—Explosion Proof
REACTORS—23"x70' 5S Lined; 8'x32'6"
STEEL PIPE—2" to 30" 1500 Ton
TANKS—(2) 7,000 BBL. Vertical Storage
TRANSFORMERS—333 & 750 KVA-2,400/4,160-480

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- 2,000 BBL. ALKYLATION (1953)
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- 150 CENTRIFUGAL, HOT OIL and STEAM PUMPS
- 500 INSTRUMENTS; RECORDING, CONTROLLING, ETC.
- TETRA ETHYL weighing station with 8,500 weighing tank.

—TOWERS—

Dia.	Height	Trays	Psi.
144"	96'	27	25
90"	109'	50	160
90"	56'	20	35
78"	78'	30	245
66"	70'	30	250
60"	76'	28	120
60"	33'	15	245
54"	39'	16	35
54"	32'	10	55
48"	34'	4	275
42"	61'	24	100
42"	22'	8	130
42"	30'	8	25
36"	58'	30	154
36"	47'	20	120

HEAT EXCHANGERS

Quan.	Tube Material	Sq. Ft.
10	Admiralty	2,000 to 4,600
13	Admiralty	920 to 1,730
10	Admiralty	200 to 636
8	Steel	2,000 to 2,600
35	Steel	920 to 1,720
12	Steel	100 to 600
30	Finetube (Adm. & Steel)	20 to 190

COMPRESSORS & BLOWERS

Mfg.	Type	CFM	PSI.	HP.
Carrier	Cent.	38,300	32.7	3,370
Carrier	Cent.	9,370	124.7	2,310
Carrier	Cent.	9,750	93	1,410
IR	Recip.	3,170	125	600

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HELP WANTED

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We have openings in district offices of our domestic producing operations. Minimum of three years production experience plus BS degree required. Experience in reservoir engineering, waterflooding, down-hole corrosion, gas operations, or general field operations is acceptable. Response should include salary expected and complete resume of education and experience. Reply to Chief Engineer, Production Department.

Continental Oil Company,
P. O. Box 2197, Houston, Texas.

CHEMICAL, PETROLEUM OR POWER ENGINEERS

The Foxboro Company is adding to its group of staff sales engineers to keep pace with its steadily increasing share of the industrial instrumentation industry market. Men needed should be graduate engineers with several years of instrumentation or process control experience in the chemical, petroleum, gas or power industries. You must be sales minded and should enjoy working with our customers and sales personnel. If you feel qualified for one of these challenging career opportunities send a letter and resume to:

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NEW OIL JOB Directory, foreign and domestic, showing where to apply for jobs. 500 selected producing, refining, butane and pipeline companies. Nationwide $6.00 cash OJML Co., Box 2603, Tulsa, Oklahoma.

PIPE LINE SURVEYOR Major Gas Transmission Company, headquarters in Midwest. Age to 35. Experience in pipe line location, office and field drafting necessary. Box L-598, The Oil and Gas Journal, Tulsa, Oklahoma.

MANAGER

Engineering, Contracting Company, well financed, good reputation, needs general manager. Good opportunity available for man experienced in industrial, petrochemical, and refinery engineering and construction. All replies held in confidence. Submit resume to P. O. Box 2963, Houston 1, Texas.

WANTED: SALES ENGINEERS

Manufacturers representatives now calling on the oil and gas pipeline industry. Some experience in selling instruments and controls or cathodic protection to the trade helpful but not necessary.

BOX L-587

THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

ASSISTANT MANAGER
(Engineering & Design)

A responsible position in the Chicago area with an international engineering and construction firm is available for an individual having a background in the engineering and design of oil refineries, chemical and petrochemical plants. Must have an engineering background and some field or office administrative experience.

Resume should include salary requirements, educational background, experience and be sent to:

BOX L-596

THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

RESEARCH—
TECHNICAL SALES SERVICE

A recent position created in our Petrochemical Research Division offers exceptional opportunities to a man interested in either research or technical sales. This man should have ideas and experience in oil field drilling or production work. Here is a chance to develop and promote your ideas for new products in a growing organization.

Background needed for this work is a college degree in a field of technology, three to five years experience in lab, field, or technical sales and enthusiasm.

Send resume to:

INDUSTRIAL RELATIONS DEPT.
CONTINENTAL OIL COMPANY
PONCA CITY, OKLAHOMA

HELP WANTED

FIELD ENGINEER Graduate Civil Engineer for permanent position with Major Gas Transmission Company located in Midwest. Age to 35. Experience in office design, location and property surveys. Must travel. Box L-599, The Oil and Gas Journal, Tulsa, Oklahoma.

REPRESENTATIVE WANTED for well established manufacturer of oil well subsurface pumping equipment. Excellent territory open. Our employees know of this ad. Box L-582, The Oil and Gas Journal, Tulsa, Oklahoma.

PROJECT ENGINEER for permanent position with consulting firm. 5-10 years broad experience in pipeline and distribution terminal design. Salary open. Sesler & Associates Inc., 1000 Wilshire Blvd., Los Angeles 17, Calif. HUntley 2-1874.

ASSISTANT SUPERINTENDENT

For natural gas processing plant, capacity 50 million cubic feet, near McAllen, Texas. Applicant should have five years plant experience. Salary commensurate with experience. Please submit detailed resume of education and experience to:

Box L-592

The Oil and Gas Journal
Tulsa, Oklahoma

SITUATION WANTED

PROVEN OIL finder, 42, Division Geophysicist and Chief Geophysical Interpreter, desires responsible domestic assignment as supervisor or interpreter. J. B. McKee, 1517 Melrose, Norman, Oklahoma; Telephone JE 6-1431.

CONTROLLER'S OR TREASURER'S department: Presently employed as a controller. Experienced in public and private accounting. Excellent background-financial statements, federal and state taxes, systems and procedures, machine accounting, cost reports, budgets. B.B.A. degree in professional accounting. Will relocate. Resume on request. Box L-585, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 33 years, married w/family. Excellent background. Production, completion and workover operations. Proven ability. Presently employed Venezuela. Five years foreign, five years mid-continent experience. Desires change, preferable foreign or Alaska. Responsible engineering or supervisory position. Box L-581, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER—BSIE 11 years experience with strong mechanical oil industry background. Seeks engineering or sales position. Will relocate. Box L-594, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT—17 years heavy industrial experience in supervisory capacity, including all phases of general and cost accounting. Two years oil production. Box L-573, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES AND MANAGEMENT: 10 years experience with wire-line service firm, all phases. Age 37. BA, Geology. Box L-602, The Oil and Gas Journal, Tulsa, Oklahoma.

ADMINISTRATOR— 25 years experience in land, sales, and administration with Major company. Interested in position with Independent or drilling contractor. Capable of assuming full responsibility. Box L-600, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE LINE traffic analyst middlewest 12 years experience petroleum products and LPG terminal studies, tariff compiler, freight rate analyst for pipe line construction materials I.C.C. Practitioner, MASTT. Box L-601, The Oil and Gas Journal, Tulsa, Oklahoma.

LOGS AVAILABLE

DUE TO RETIREMENT from area, many sample logs, about 1,850 electric logs, and large file scout tickets, mostly Montague, Cooke, Grayson, Collin, Denton, and Wise Counties, North Texas. Price $1,000.00. Hubert E. Bale, 6407 Desco Drive, Dallas 25, Texas.

ROYALTIES

HIGHEST PRICE PAID for oil and gas income royalties, overrides, oil properties. A. S. Berry, 109 Midco Bldg., 302 South Cheyenne, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

WATER FLOOD Franklin County, Kansas. 640 acres, good engineering and best equipment, modern in every respect. Wonderful potential, good reason for selling. No brokers. Unless you are financially responsible do not reply. Box L-326, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTIVE 240-acre farm, seven-room house, large barn, near several oil wells, not leased, adjoining land leased for oil. $150 per acre. Box L-597, The Oil and Gas Journal, Tulsa, Oklahoma.

WATER FLOOD Kevin-Sunburst field in Montana. Lab analyses of recent cores show 37' saturated pay zone and indicate approximately 3 million barrels of pipe line crude oil to be recovered by water flooding. We would like to contact parties with 'WATER FLOOD' know-how and finances to extend our present pilot flood. This is not an offer of sale. Imperial-Craig Co., Kevin, Montana.

SOME SHALLOW drilling deals with good geology. If interested write for particulars. References furnished. R. E. Clement, Box 65, Norman, Oklahoma.

KENTUCKY—500 acres Casey County, 1,000 acres Russell County, 1,100 acres Pulaski County another 600 acres Pulaski County adjoining drilling well and near shallow oil field. 1,000 acres Cumberland County. Long term, low rental, commercial leases, package deals for small bonus and override. Inspection invited. Wire-phone—Wilbur V. Cravens, Russell Springs, Kentucky.

OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2,000 acres. Write quickly to: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

DRILLING BLOCKS in Grayson, Butler, Breckinridge and Muhlenberg Counties, Ky. Write, call or see me if you can drill, promote, or buy acreage. Phone MU 4-1738, Frank Patterson, 434 Locust St., Owensboro, Kentucky.

DRILLING or PRODUCTION DEALS or FARMOUTS WANTED

Interested in acquiring total or partial interest in drilling or producing properties.

Syndicate Oil Corporation
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Tulsa, Oklahoma

PRODUCTION FOR SALE

PRODUCTION FOR SALE: Approximately 110-acre lease with wells pumping average 300 bbls. daily. Half of lease can still be drilled. Located in central Kentucky. P. O. Box 219; Greensburg, Ky.

PRODUCTION WANTED

WANTED: Oil and Gas Production Royalties and overriding royalties, drilling deals and acreage. Bright Uranium Corp. 434 Title Guaranty Building, St. Louis 1, Missouri.

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LEGAL

SEALED BIDS will be received until December 17, 1959, 2:00 P.M., Central Standard Time, and opened at that time in the Office of the Superintendent, Cheyenne River Indian Agency, Cheyenne Agency, South Dakota, for the leasing of 20,902.83 acres of Tribal land and 9,342.40 acres of Allotted Indian land, located in Townships 14, 15 and 16 North, Ranges 17, 18, 19 and 20 East of the Black Hills Meridian, Ziebach County, South Dakota, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent, Cheyenne River Indian Agency, Cheyenne Agency, South Dakota.

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(including company)
and
(2) your NEW address

We need them both to make the change. Also confirmation of your company connection and position.

The Oil and Gas Journal
Box 1260 Tulsa, Okla.

(Continued from page 130)

The test is 11 miles northeast of the United Fuel 1 Stamper wildcat in Carter County, currently testing gas shows in the Cambro-Ordovician section.

Remote oil field found in Colorado

Lansing-Pennsylvania oil production was opened in a Kiowa County area of southeastern Colorado by J. M. Huber Corp.

New pool opener is 1 Stubbs in NW NW 15-19s-45w, 30 miles southeast of Eads. The well reports a pump potential of 65 bbl. of 36°-gravity oil daily from perforations at 3,682-84 ft. Nearest production is at West Clift field in Greeley County to the east in Kansas.

Texas' Hansford bags dual gas discovery

A dual-zone gas discovery was reported in southeastern Hansford County in the Texas Panhandle, 12 miles southeast of Spearman.

The discovery well is Pan American Petroleum Corp. 1 Kansas City Mineral Royalty Co. in Section 45, Block R, ABA&M Survey. Calculated open flow from Cleveland Pennsylvanian through perforations at 6,526-30 ft. was 2,600 M.c.f.d. The Morrow Pennsylvanian made 10 M.M.c.f.d. at 8,400-36 ft.

Discovery wells

COLORADO

Logan County: Ambassador Oil Co. 1 Norcott, C SW NW 26-11n-55w. IPP 40 BOPD, 100 BWPD, "J" sand discovery, new field, 5,459-65 ft. TD 5,518 ft.

NORTHWEST NEW MEXICO

Rio Arriba County: El Paso Natural Gas 33-13 San Juan Unit 29-6, NE NE 13-29n-6w. IPF Mesaverde 4,575 M.c.f.d., ¾-in. choke; IPF Dakota 2,934 M.c.f.d., ¾-in. choke. Mesaverde zone 5,355-5,804 ft., Dakota zone 7,844-7,948 ft. TD 8,078 ft. Dual completion, Dakota discovery, new field.

El Paso 32-29 San Juan Unit 29-5, SE SW 29-29n-5w. IPF Dakota 3,083 M.c.f.d., ¾-in. choke, IPF Mesaverde 5,038 M.c.f.d., ⅜-in. choke. Mesaverde 5,622-5,724 ft., Dakota 7,775-7,872 ft. TD 8,030 ft. Dakota discovery, new field.

OHIO

Guernsey County: J. B. Drilling Co. 1 Ralph Smith, Sec. 2, Oxford Township, IP 1 BOPD, Berea 1,443-69 ft. TD 1,554 ft.

Stark County: East Ohio Gas Co. 1 G. C. Lindsey, Sec. 16, Lawrence Twp. IP 572 M.c.f.d., Rock pressure 1,260 psi. Clinton 4,186-4,237 ft. TD 4,243 ft. Gas discovery.

WEST CENTRAL TEXAS

Throckmorton County: Bayview Oil Corp. 1 J. T. O'Dell Unit, Sec. 689, TE&L Sur., 4 miles southwest of Woodson. IP 40 BOPD, 10/64-in. choke, 42°, GOR 500:1, TP 120 psi., Marble Falls 4,444-48 ft. TD 4,725 ft.

SOUTHEAST NEW MEXICO

Lea County: Jess L. Warren 1 Union-State, NW NW 8-10s-37e, 3 miles south of Cross Roads field. Recompletion. IPP 50 BOPD, 34°, San Andres 4,945-80 ft. Old TD 5,048 ft., PB 5,014 ft.

OKLAHOMA

Beaver County: Sun Oil Co. and Cabot Carbon Co. 1 David Penner, C NW SE 12-2n-20eCM. IP 4,200 M.c.f.d., Miss. 7,328-34 ft., 7,347-90 ft. TD 7,466 ft. New pay in South Boyd.

Vickers Petroleum Corp. 1 Farrell, C SE NW 6-2n-27eCM. IP 1440 M.c.f.d., 75 BWPD, Tonkawa 5,683-93 ft. TD 8,040 ft. New field.

Vickers 1 Thomas Eades, C SE NW 26-3n-26eCM. IP 844 M.c.f.d., 120 BWPD, Morrow 7,477-90 ft. TD 7,802 ft. New field.

Beckham County: Cecil Simms 1 Denby, NW SW SE 16-8n-22w. IP 27,010 M.c.f.d., Granite Wash 1,294-1,315 ft. Shut in gas well.

Custer County: Gulf Oil Corp. 1 Burgtorf, SE NW 6-13n-15w. IP 2-716 M.c.f.d., Springer 13,365-425 ft. TD 14,079 ft.

Dewey County: Texaco, Inc. 1 Devereaux, C NW SW 9-17n-14w. IP 9,490-9,500 ft., 9,516-76 ft., 9,598-9,618 ft. TD 11,872 ft. New field.

Ellis County: Sinclair Oil & Gas Co. 1 Anson J. Woods, C SW NE 2-23n-26w. IP 10,450 M.c.f.d., Morrow 8,332-35 ft., 8,339-57 ft. TD 8,646 ft. New field.

Greer County: Shamrock Oil & Gas Corp. 1 D. C. Frost "A," SE NW 24-6n-24w. IP 356 M.c.f.d., Granite Wash 1,280-1,360 ft. TD 1,462 ft. Opens Jester pool.

Kay County: Pete Morris Drilling Co. 1 Wilkerson, NE NW SW 32-25n-2e. IP 72 BOPD, 44°, First Wilcox 4,345-56 ft. TD 4,356 ft.

Love County: Pasotex Petroleum Co. 1 Max C. Brannan et al. Unit, 32-7s-3e. C NE IP 31,500 M.c.f.d., Oil Creek 14,487-14,547 ft. TD 14,620 ft. Southeast Marietta.

McClain County: Fain-Porter Drilling Co. 1 Williams, C S½ SE NE 8-6n-3w. IP 127 BOPD, 40°, First Bromide sand 10,926-932 ft. TD 11,024 ft.

Oklahoma County: Elmer Messenger Oil Co. 1 Olsen, C NE NW 12-13n-1e. IP 6,516 M.c.f.d., 5,101-90 ft. TD 5,445 ft.

Pottawatomie County: James S. Wise 1 Wheeler, SW SE NE 33-11n-2e. IP 51 BOPD, 35°, Unconformity sand 5,475-84 ft. TD 5,985 ft. New field.

Texas County: Peerless Oil & Gas Co. and Jake Hamon 1 Terry Wall, C SW NE 4-1n-17eCM. IP 1,606 M.c.f.d., Chester 6,907-6,913 ft., 6,919-26 ft. TD 7,147 ft. New field.

Skelly Oil Co. 1 Montgomery "A," 11-2n-15eCM. IP 48 BOPD, 36 BWPD, 34°, Cherokee 5,800-18 ft. TD 6,820 ft. New field.

Cabot Carbon Co. 4 B. A. Calvert, C SW NE 11-3n-16eCM. IP 350 M.c.f.d., Morrow 6,598-6,612 ft., 6,619-30 ft. TD 6,675 ft. New field.

Shell Oil Co. 1-8 Balzer, C SW NE 8-3n-17eCM. IP 52 BOPD, 154 BWPD, Morrow 6,360-87 ft., Chester 6,560-80 ft. TD 6,731 ft. New field.

Graridge Exploration Co. 1 Brumley, C NW SE 7-4n-10eCM. IP 3,280 M.c.f.d., Morrow 4,442-50 ft. TD 4,852 ft. New pay in Northwest Ona field.

Peerless and Hamon 1 Henderson, C NE SW 5-5n-18eCM. IP 858 M.c.f.d., Chester 6,482-90 ft., 6,508-15 ft. TD 6,737 ft. New field.

NORTH TEXAS

Archer County: Gulf Oil Corp. 1 R. G. Jones, Sec. 1898, TE&L Sur., A-578, 7 miles south of Windthorst, 1 mile south of Burns-Jones field. IPP 242 BOPD, 44°, GOR 185:1, Mississippian 5,344-84 ft. TD 5,836 ft., elevation, 1,062 ft.

Cooke County: L. O. McMillan and Kay Kimbell 3 H. H. Collums, T. Toby Sur., A-1056, 6 miles northeast of Callisburg, recompletion and new-pay discovery. IPP 168 BOPD, 41°, GOR 652:1, pay 4,669-79 ft. TD 7,355 ft.

Jones County: Harold G. Neeley 13 Jones-Stasney & Bowden, Sec. 196, BBB&C Sur., 2½ miles east of Avoca, Cisco sand discovery in Avoca field. IPP 35 BOPD, 39°, GOR 368:1, pay 2,272-83 ft. TD 2,305 ft.

Stephens County: Cunningham & Shahan 1 Drenman, P. L. Leman Sur. 60, A-101, 10 miles north of Eastland. IP 7,430 M.c.f. of gas, Strawn sand 1,896-1,906 ft. TD 1,914 ft. Flowing pressure 320 psi., shut-in pressure 965 psi.

Carl A. Whittenton 1 Carrie Tipton, J. P. Abrams Sur. 27, 5 miles southwest of Eolian, new pay in Miller field. IP 108 BOPD, 21/64-in. choke, 47°, GOR 1900:1, TP 550 psi., conglomerate 3,972-76 ft. TD 4,170 ft.

TEXAS PANHANDLE

Hansford County: Gulf Oil Corp. 1 Blodgett-Glover Unit, Sec. 88, Blk. 4-T, T&NO Sur., 1 mile south of Spearman. IPCAOF: 52 M.M.c.f.d., Cleveland 6,242-58 ft. TD 8,100 ft.

Hutchinson County: Cabot Carbon Co. 1 Effie Mae Meadows, Sec. 31, Blk. M-21, TCRR Survey, 9 miles north of Skellytown. IPCAOF 18,200 M.c.f.d., Penn. "A" zone 5,441-53 ft.; IPP 135 BOPD, plus 33% water, 26°, Penn. "B" 5,716-40 ft. TD 6,740 ft. Oil-gas discovery.

Ochiltree County: Mayflo Oil Corp. 1-839 Kirmse, Sec. 839, Blk. 43, H&TC Sur., 6 miles southeast of Perryton. IPF 250 BOPD, 15/64-in. choke, 42°, upper Morrow 7,756-60 ft. TD 8,322 ft. Oil discovery.

Roberts County: Gulf Oil Corp. 1 B. A. Byrum et al. "A," Sec. 5, Blk. B-1, H&GN Sur., 5 miles northeast of Miami. IPF 429.87 BOPD, ¾-in. choke and 23.46 bbl. water per day, open hole Penn. Granite Wash "B" zone, top pay 8,990 ft. TD 11,605 ft. Oil discovery.

WEST TEXAS

Karl Hoblitzelle 1 B. H. Taylor, Sec. 11, H&GN Sur., A-275, 2 miles east of Norton, new-pay discovery. IP 100 BOPD, 16/64-in. choke, 46°, GOR 250:1, TP 180 psi., pay 3,897-3,900 ft. TD 4,363 ft.

UTAH

Duchesne County: Standard Oil of California 3 Uintah-Ouray, C NW SW 5-1n-2w. IPP 306 BOPD, Wasatch discovery, new field. TD 13,354 ft. Perfs. 10,005-35, 10,040-60, 10,100-35, and 10,140-60 ft.

Gulf Oil Corp. 1 Unit, NW SW 5-7s-4w. IPP 54 BOPD, 25 BWPD, Green River discovery, new field. Cut notch-Green River, 4,296 ft. TD 8,552 ft.

(Continued from page 114)

J. Scott Gassaway is manager

. . . of mechanical engineering of product development, with direct responsibility for the mechanical design group at Genesys Corp. Gassaway formerly was with North American Aviation, Inc., and was owner-manager of his own company. He holds four patents in the field of electro-mechanical devices.

L. Glenn Rader is named veep

. . . and special sales representative in the New Orleans area of Maloney-Crawford Tank & Mfg. Co., reports R. C. Schenk, president of the Tulsa firm. Rader has served as vice president and sales manager since 1956. Previous to that he was vice president and division manager for 11 years.

A veteran of over 25 years in oilfield equipment, Rader was one of the organizers of Crawford Tank & Supply Co., and served as division manager at Houston from 1943 until 1945. He was with Parkersburg Rig & Reel Co. before joining Maloney-Crawford.

E. E. (Dusty) Rhodes appointed

. . . sales and service representative in Oklahoma by Oil Metering & Processing Equipment Corp., Houston. Rhodes was formerly a sales representative for Texsteam Corp. in Oklahoma, and also sold Texsteam products in the Rocky Mountain, West Texas, and Texas Gulf Coast areas. He will now sell and service Metrol metering and testing equipment made by Oil Metering & Process Equipment.

William W. Cross assumes post

. . . as sales representative for Leschen Wire Rope Division, H. K. Porter Co., Inc., according to R. Rex Hartup, general sales manager. Cross will be responsible for Kansas, Oklahoma, and Northern Texas.

The new Leschen employe has held positions with Date Equipment Co. at Dallas and with Hoover Equipment Co. and Hughes Tool Co. at Oklahoma City. He replaces Irl Bergin who has been transferred to the New Mexico-Arizona-Southern California territory.

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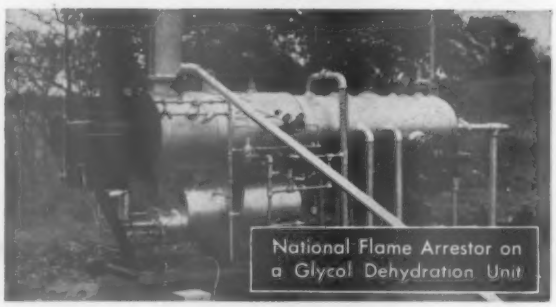

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B. The automatic robot pilot will automatically light the pilot with no attending personnel and will automatically shut off the gas supply in case of failure of any part of the burner system.

Install National Flame Arrestors on existing equipment and specify National Flame Arrestors on all future purchase of field equipment to insure maximum safety for life and property.

THE NATIONAL FLAME ARRESTOR CONTAINS THE PROPER ARRANGEMENT OF ALL NECESSARY COMPONENTS TO MAKE A PERFECT ARRESTOR — ANY LESS IS POSITIVELY INADEQUATE AND DANGEROUS . . .

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Why "Seal·Grip" is your most dependable replaceable tool joint

DESIGN. All mating surfaces — outer seal, pipe threads and inner seal — are on the same taper, assuring uniformity of fit on initial and replacement installations. This feature permits make up to compensate for possible deformation when applying new joints on used pipe, or old joints on new pipe.

COLD-ROLLING. The large land of all "Seal-Grip" pipe is cold-rolled at the mills. This process so increases the fatigue resistance of the pipe that failures have been eliminated in this zone.

COPPER PLATING. To protect the threads and shoulders against galling during the critical break in period, all Hughes tool joints are copper plated. Years of service have proved copper plating to be the most effective anti-galling agent yet developed for tool joints.

HARDFACING. "Hughesite"—developed and manufactured by Hughes — assures long-lasting protection against tool joint wear. Interruption of the guide ribs with hardfacing provides a continuous wear-resistant surface that protects the guide ribs and adjoining tool joint metal against undercutting.

SNOW TESTING. In addition to processing controls to safeguard the quality of Hughes hardfacing, all Hughes hardfaced tool joints are "snow" tested — a new inspection method that is a positive check of the bonding of hardfacing to the parent metal of the tool joint.

40 YEARS EXPERIENCE. Starting with the first alloy heat treated tool joint, Hughes has put more joints on pipe than all other manufacturers combined.

"Seal-Grip" tool joints are also available for attachment on new API LIGHTWEIGHT drill pipe.

SEAL GRIP®

A DEVELOPMENT OF

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